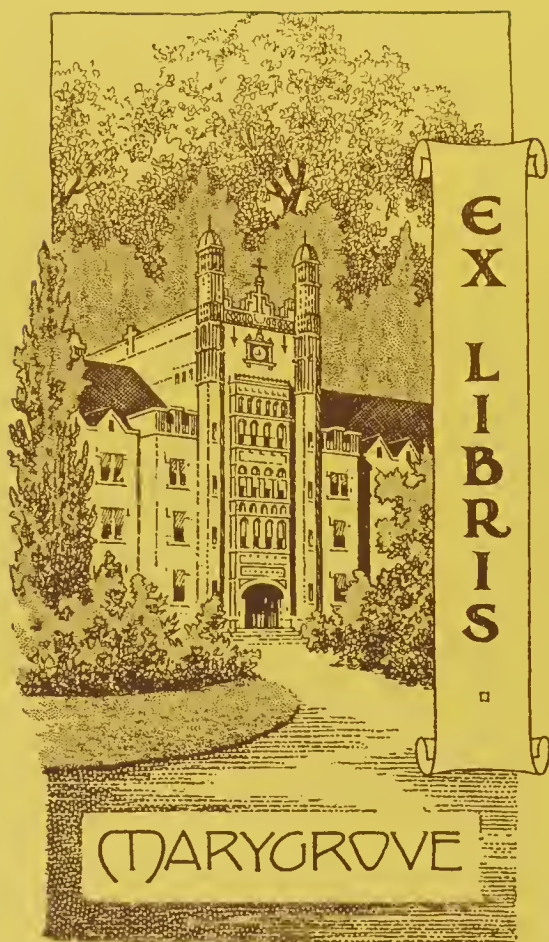


GLASS~PAINTS

PITTSBURGH PLATE GLASS
COMPANY







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GLASS



PAINTS, VARNISHES AND
BRUSHES

GLASS PAINTS, VARNISHES AND BRUSHES

THEIR HISTORY
MANUFACTURE AND USE



1923

PITTSBURGH PLATE GLASS COMPANY
PITTSBURGH

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PITTSBURGH PLATE GLASS COMPANY

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INTRODUCTORY NOTE

ORIGINALLY this book was planned to be merely a catalogue, though a highly comprehensive and serviceable one, of the manifold products of the Pittsburgh Plate Glass Company. Since the objective of this Company during the forty years of its existence has been Service, and Service its watchword, this catalogue likewise was designed to serve the dealer, and through him the ultimate consumer, with sincerity and helpfulness far beyond the ordinary.

The work has grown on our hands; the book has become a volume; in smaller compass it was impossible to carry out our ideal.

Even where achievement is actual and worthy, modesty is becoming; yet unassuming pride just as truly befits the doer of things worth while. The American plate glass industry dominates the world-field. The history of that industry is the history of the Pittsburgh Plate Glass Company, and this Company is justly proud of its large share in hard-fought development and of the commanding position won.

Frankly proud, too, is this Company of the fact that American plate glass is unequaled the world over in beauty and sustained quality, and that the Proof Paint and Varnish Products and Brushes of the Pittsburgh Plate Glass Company are the accepted standard of excellence.

This work includes adequate historical notice of the kindred industries to which our activities of a lifetime have been devoted: Glass, in all commercial and many artistic forms; Paints, and Varnishes, and the Enamels which partake of the nature of both; and the Brush, equally important as the paint or varnish.

This historical record shows how natural has been the growth of this Company, how orderly the enlargement of its field of production: first, a struggle for existence, culminating in mastery of process in plate glass making; then, the firm establishment of the business by large-

quantity manufacture and the vital economies it makes possible, coincident with further development in the manufacture of mirrors, window glass, and other kinds of glass used in the building trades; and lastly, the solution of the problem of distribution by means of the nation-wide Warehouse System.

Presently, just as in nature cell-growth keeps pace with the developing needs of the physical organism, so the desire long ago manifested by the building trade for a unified, reliable source of supply for standardized paints, and varnishes, and brushes of highest quality appealed to this Company as a demand that must be met. Expansion along those lines was the logical policy.

How thoroughgoing our accomplishment has been; how unstinted this Company's expenditure of time, and money, and experimental labor to satisfy every demand of our trade, and to produce in every manufactured item the very best of its class, may be judged to some extent by study of the catalogue pages following. For sure appraisal, however, of the high degree in which we have succeeded, we rely confidently upon the expressed approval of those whose satisfaction is our success—our customers throughout the world.

From cover to cover, this is a practical book. This Company for a generation has set itself to the task of educating the American public to the countless uses and the supreme usefulness of fine glass. That same work of education, as to both glass and paints, this book continues, in form for preservation and reference. Without detracting in the slightest from its commercial catalogue value, which is reinforced by copious indexes, and, in the Paint Section, by ready-to-use Specifications, the volume is intended to be a distinct contribution to the literature of three great industries.

Besides all else, it tells how our products are made. Young and old will find this knowledge worth having; and we are glad to believe that the host of users of our glass, paints, oils, varnishes, enamels,

and brushes will have more interest in what they buy, when they have seen with their own eyes, as it were, how sincerity of purpose and superlative technical skill, with every material resource large capital can command, result in an honest product.

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GLASS



THE CRYSTAL GAZER



THE ROMANCE OF GLASS



THE ancient Crystal Gazer, peering into the depths of his mystic sphere, sought to unveil the strange things that lay hidden in the years. Suppose for a moment that by some flight of fancy or gift of divination he could have traced through centuries to come the future story of that very crystal that lay beneath his hand! How Glass, from its discovery in the remote dawn of the handicrafts, a crude, unlovely thing, on down through the generations was to wax in beauty and in usefulness—in service to the race!

Would not the Romance of Glass, from its beginning in—who knows where?—to the relative perfection of the industry in Twentieth Century American glass-works, have unfolded a picture worth the visioning?

Many thousands of years before the Christian Era this romance began. It is older far than Pliny's tale of the Tyrian mariners who, he recounts, landed in some Mediterranean harbor to cook themselves food, and to prop their kettles over the fire used lumps of natron—ballast from their ship. How fire fused seashore sand and sodium-salt together, and in the cooling embers these seamen found the first Glass known to man—'tis a plausible fancy: true or not, what matter?

This much we know: that in some such chance discovery, beyond human record or tradition, our industrial Romance had its origin, and that Glass, as much by some inherent wizardry as by the genius of man, has become handmaiden of the arts and minister to every science.

PITTSBURGH PLATE GLASS COMPANY

The Romance of Glass produced, in Gothic cathedrals, such noble rose windows as the masterpiece of Rheims, triumph of Thirteenth Century art, known to millions of worshipers in northern Europe as the "Window of Paradise." Stained glass, through the ages, has ever been a medium through which artistic inspiration has found lofty expression.

All we know of the planets and suns in remote space falls into place in the Romance of Glass. Without lens, and mirror, and prism, we could



have no telescopes or spectroscopes wherewith to pry into the secrets of the stellar systems. Three of the most marvelous of all achievements of modern times—wireless telegraphy, wireless telephony, and the Roentgen ray—depend in essential particulars on high-vacuum tubes of glass.

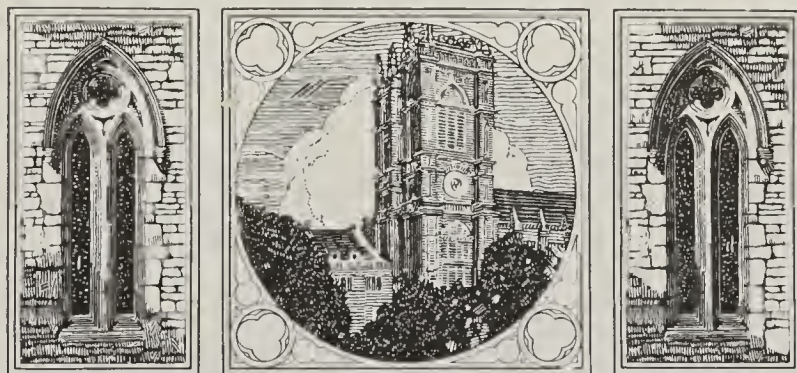
The camera lens has added horizon after horizon to the outlook of humanity, for by aid of this carefully wrought bit of glass man is able to illustrate the record of his ideas and make known to all who read, the actual appearance of things which otherwise they might never see. The moving picture camera has its part in this tale of wonders, for glass has made possible the lenses that record on the film the doings of mankind and project them on the screen for the enjoyment of millions.

Human life has been lengthened and preserved by glass. How could disease have been so shorn of its terrors and some scourges practically eradicated, had medical and chemical science no microscope for the study of bacterial life, no hollow glass for analysis and experiment? Light and

THE ROMANCE OF GLASS

air in abundance, which are health, have become a universal boon. No legislator of today would dare attempt to levy a tax on windows, as was done in early England: too keenly this generation appreciates the comfort of its homes, and offices, and factories, flooded with light and yet airy, thanks to plate glass and window glass, both within reach of all.

In this Romance of Glass, the mirror has a fascinating chapter all its own. The women of Rome, and Athens, and Pompeii must needs content



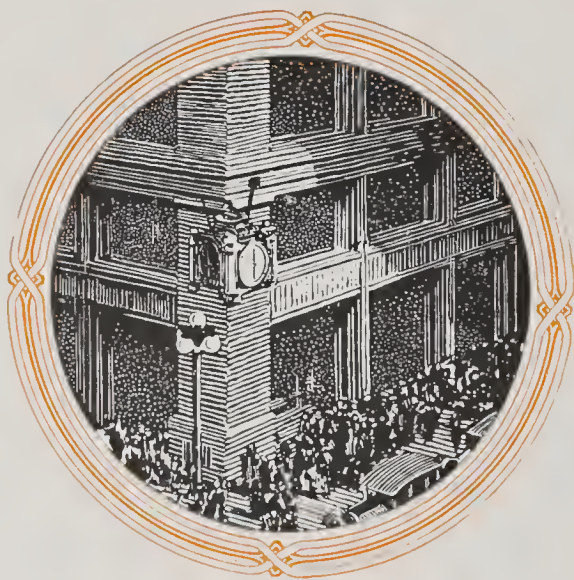
themselves with looking-glasses of burnished metal, whereas today perfect mirrors of polished plate glass, with flawless silvering, may be found in the humblest home. For, from being the gaud of voluptuous fashion and of empty vanity, the mirror has come to be a utility and a necessity, serving individual self-respect in its personal use, and, in its decorative use in the marts of trade, the purposes of business in an industrial age.

Indeed, it is the requirements of prosaic modern industry that have made the Story of Glass the romance that it is. Millions pass daily the plate glass fronts that line the business thoroughfares of cities the world over, and give never a thought to the industrial achievement that plate glass represents. They look, not at the polished plate, but through it at the display beyond; they see clearly, perfectly—and plate glass has accomplished what was intended. Centuries of toil, of failure and slow-won success, have brought forth this marvel, and those who have been privileged to share in the work have warrant for their proper pride.

PITTSBURGH PLATE GLASS COMPANY

These transparent sheets of gleaming crystal have grown, magically as a fabled Aladdin's tower, from hard white sand. And the actual wonder-worker performing the prodigy is a magician of our own time and country—the American plate glass factory.

Once, when "all roads led to Rome," the road of glass was one of those, but today this is but one of the many roads that lead to America. It has been the good fortune of this richly endowed land to breed or nurture the creators of many things that have changed life conditions on the face of the globe. Among them is glass, and though to ancient Oriental races we yield the palm for discovering the secret of glass-making, and may concede the supremacy of ancient Venice in its field of vitric art, credit for the latest and most engrossing chapter in the Romance of Glass belongs by good right to America.





THE HISTORY OF GLASS



IN ALMOST all historical discussion of glass there is to be noted a failure to distinguish clearly between two well-defined periods—the one extending through many ages when men used glass chiefly for ornament and in art; and the other more significant period when glass had come to be recognized as a utility capable of changing radically the conditions of human life. Yet it was this transition from one epoch to the other that marked one of the mightiest stages in the progress of civilization.

It is true that archæologists believe, from discoveries in excavation, that the early Romans made some small use of sheets of glass for window purposes; but such use may have been accidental or incidental, for it certainly was not extensive. It was not until the Fourth and Fifth Centuries that glass became really important in the minds of men as something to *look through* rather than to *look at*, and even for a long time after that (an interval to be reckoned in centuries) men seem to have been singularly blind to

what this use of glass for windows might mean to the race. Perhaps the age-long idea of glass as merely decorative held them bound; in any case, the material was used only for glazing churches, and there, obviously, its value was not for vision, but merely for the admission of light. Houses of worship required only slight illumination, and the glass-maker of the period had no incentive to strive for a high degree of transparency. We must follow history almost to the time of the discovery of America before we find Europe genuinely entering the “age of windows.”

The exact facts as to the discovery or invention of glass have been in dispute for centuries. The probability is that the discovery was accidental, although it may be that some ancient metallurgist came upon the process through studying the vitreous slag produced in smelting. Nearly all the oldest fragments of glass that have come down to the present time are colored, and the coloring matter appears to be metallic.

The Roman naturalist Pliny's famous anecdote about the discovery of glass by Phœ-



Before Glass Became Transparent

The wealthy collectors of ancient Rome thought of glass as something to look *at*, not *through*. Their glass-workers produced beautiful objects, some of which we can see in our museums today, but their windows were merely openings in the wall, admitting wind as well as light.

THE HISTORY OF GLASS

nician sailors does not seem to be supported by convincing evidence; but we do know, from the indisputable testimony of ancient wall-paintings and relics, that the Egyptians made glass many centuries before the Christian Era. Pictures found in the tombs at Memphis and Beni Hassan show men in the actual operation of blowing glass. One picture represents Egyptian glass-makers sitting before an upright circular furnace one foot in diameter and about three feet high, apparently taking out molten glass through a small hole at the bottom.

The Assyrians knew glass, and interesting specimens have been found in the ruins of Nineveh, but as with the Egyptians, its use was confined to ornament. Some of these ornaments are crude, while many, on the other hand, are exquisite and justify our sincere admiration, for our own artists could not produce more beautiful shapes and designs. Still it is important that the reader understand that this concededly high art was merely the art of the craftsman in manipulating his material and fashioning it wonderfully; the material itself was not good. White glass as we have it (and by this term we mean a completely transparent glass that is practically colorless) was unknown to the early makers.

When therefore we admire, as we must, the ancient embossed and moulded vases, the charming glass mosaics, the beads and imitation precious stones, and the many graceful flagons, we admire the handiwork of the artist, not the glass itself. The cheapest sheet of modern glass is purer, more transparent, and altogether better than the best of the ancient material. The

Greeks, even in the height of their art-period, did not devote themselves very seriously to glass, and their activities are altogether unimportant compared with those of Rome in its glass-making era. The influence of Greek decorative art is seen in much ancient Roman glass, but the Greeks seem to have left no impress on the art of making the glass itself.

Historians do not agree on the time when Rome became notable for glass-working. The first Latin author who makes any extended reference to vitric art is Cicero (106–43 B.C.), writing toward the end of the pre-Christian Era, but there are those who contend that Roman activity in glass-making began at least four centuries before Cicero's day. Certain it is, however, that Rome's real ascendancy in the craft came only with the Empire of the Cæsars.

The Romans carried glass to Asia through Byzantium, to Germany and France, and into England. Later, when the glass-makers, with other artisans, were dispersed by the incursions of the barbaric hordes, they established the manufacture in many parts of Europe, and probably it was in such manner that Venice attained at so early a period to its commanding rank as first and foremost of modern glass-making centers.

The art of glass-making may have been carried to Venice as early as the Fifth Century, but there is no record of the Venetian industry, as such, earlier than 1090 A.D. In the latter part of the Thirteenth Century Venetian glass-making became localized almost wholly on the suburban island of Murano, where, in the period of greatest prosperity, the glass-houses extended for an unbroken mile and employed eight

thousand operatives. The manufacture was not carried on in large establishments, but by artisans working individually or with a few helpers, who were bound by oath and by law to secrecy.

This system of small individual establishments ruled throughout the glass-making world for a considerable time in the early Middle Ages. The master kept his methods to himself, or imparted them to only a chosen few who paid well for instruction. Servants or slaves did the manual labor, but were excluded from any opportunity of learning. Generally the glass-house had only one pot, and each glass-maker made only one kind of glass.

Although glass-making came to Venice, as has been noted, early in the Christian Era, this art, like all others, was depressed by the fall of Rome, the wide conquests of the barbarians, and the Dark Ages that followed. It was not until many centuries later that the reawakening of knowledge and the extension of commerce in the great cities of Italy and Germany brought back the spirit that had glorified ancient art. By the Sixteenth Century, Venice had reached its zenith in glass-making. During the Seventeenth Century, the craft began to decline. By the Eighteenth Century, Bohemia had attained pre-eminence, which it held until the invention in England of the beautiful product ever since known as English flint glass.

That chapter in the story of glass which deals with its use as ornament, or as material for beautiful utensils, belongs to the history of art. But the development of glass made clear for vision is part of the record of industrial civilization. It is this latter epoch

that marks the most marvelous advance in industry and commerce, in facilities for travel, in individual comfort and public sanitation, and in intellectual achievement. When glass began to shelter and protect man, instead of merely pleasing his beauty-loving eye, he was set free for undertakings and for accomplishment which until that moment were impossible.

Passing over the scant record of attempts to use glass for windows in ancient Rome, it may be said with confidence that civilized Europe knew nothing of window glass as a real utility until within a comparatively recent period. In the early records of the present era, we find glazing mentioned only in the writings of priests and monks, and by them for an obvious reason: its use being restricted at the time to church windows. This early window glass was not blown, as now, but cast; that is, it was poured out, molten, on a stone or other flat surface, and then smoothed more or less crudely. Saint Jerome, in the Fourth Century, writes of sheets of glass so made.

The great church at Trèves, according to reasonably reliable accounts, was glazed about 420 A.D. A century later, Rome and Ravenna, we know, were proud of many churches in which glass protected the windows. The practice spread rapidly; during the same century the church of Saint Sophia at Constantinople was accounted one of the wonders of the East largely because of its many windows, set with glass panes as large as seven and eight inches wide by nine and ten inches in height!

In the Seventh Century, the Abbot Benedict sent to the Continent for artists to glaze

THE HISTORY OF GLASS

the historic church and monastery at Wearmouth, and about the same time a similar improvement was made in York Cathedral. But whereas at this period glazed edifices were exceptional, and window glass for domestic use beyond the dreams of the commonalty, four hundred years later glazed windows, at least in churches of importance, had become the rule.

While the very early window-panes were of cast glass, as has been noted, the casting method gradually passed, and was practically lost to knowledge until the French in the Seventeenth Century rediscovered it. The old-time cast pane had given place, toward the end of the Eleventh Century, to a pane made from blown glass. Theophilus, a monk whose writings shed much light on the arts and crafts of that period, has left a description of glass-blowing methods that are not greatly different from the simpler processes of present-day hand manufacture. When Venice won its leadership in the industry, its blown-glass works became renowned and its trade in blown window glass throughout Europe was considerable. When its own prestige declined, in the Seventeenth Century, Venetian workmen scattered over all parts of the Continent, and spread knowledge of the craft.

After all these centuries of slow enlightenment, the world was incredibly dull to realization of the supreme benefit within its grasp. Occasional sporadic efforts to extend state aid to glass manufacture were negated in turn by curious governmental obstruction, ranging from narrow-minded regulation to discriminatory taxation. Even the use of glass for windows was penalized by imposts

which for centuries were the rule in more than one country of Europe. Thus poor quality of glass, limited production, and excessive cost all combined to deny our forefathers the comforts and other advantages the present generation enjoys.

About the time Columbus made his voyages of discovery, manufacturers had succeeded in producing a reasonably good glass at a cost not utterly prohibitive. Glass was not cheap as cheapness was measured by prevailing incomes; it was not made on a large scale or in great quantities; it was not good according to the standards of today. But production had reached a point where glass had compelled recognition as a very necessary utility.

The first colonists who undertook to make a settlement in Virginia had been educated to the need for window glass, but the transportation facilities of the time probably did not encourage its carriage as ship's cargo. for they brought with them "eight Poles and Germans to make pitch, tar, glass, and soap-ashes." Somewhere in the Virginia forest, about a mile from Jamestown, a glass-house actually was erected.

This would fix the date of the first glass-making in America at 1608 or 1609, and it is not unlikely that this enterprise merits the distinction of being the original manufacturing industry in the English Colonies of America and hence, of the United States.

Glass-making, however, even as an infant industry, did not long survive, for a lustier infant supplanted it. Tobacco-raising, about this time, came to engross the attention of the colonists to the apparent exclusion of everything else, for in a report of 1617 the

"decay" of the glass-works is recorded. Nevertheless, only three or four years later interest in glass-making was reawakened, a new works was built, and Italian artisans were imported to man it. This second factory seems to have been established rather as a sort of mint than as a simple glass-works; for its purpose was to make glass beads, which then were acceptable as currency amongst the Indians.

This undertaking disappeared with the massacre of 1622, and from that time until the Revolution there was no further attempt at glass manufacture in Virginia. William Penn, in a letter dated 1683, mentions a "glass-house" in Pennsylvania, but nobody knows where it was or if it ever was operated. Certainly glass was by no means plentiful in that Colony, for in 1689 a sincere though not inspired poet named Holme wrote thus quaintly:

The window-glass is often here
Exceeding scarce and very dear,
So that some in this way do take
Isinglass windows for to make.

Massachusetts erected its first glass-works in Salem in 1639. The magnitude of the enterprise may be judged by the fact that in 1641 the General Court, which appears to have been more than paternalistic, authorized the town to lend the proprietors thirty pounds, to be repaid under the elastic condition "if the work succeeded, when they were able."

From the time of the Revolution, the attempts to found glass-working establishments were so numerous that any narrative

would be merely a long statistical array, with little of cheerfulness, for practically all failed. For this there were many reasons: Although extensive glass-sand deposits were to be found in America, with an adequate supply of other raw materials, there was a dearth of skilled workmen; the comparatively few foreign-trained experts could not themselves man the works, and training American artisans in glass-working required time. The bad condition of the roads and the nature of the product made long-haul transportation costly, so that it was difficult to extend business beyond the immediate vicinity of the works. People had little money and therefore bought no more glass than was necessary.

Serious as were these obstacles, they were insignificant as compared with the steady, relentless competition of foreign glass. Through all the records of the industry in America, from the Revolution almost to our own time, runs the dismal story of struggle between native and European producers. The foreign hold on our markets was strong and tenacious; on occasion, when necessary, foreign-made glass was sold below cost in order to throttle competition. So it was, that although the American glass industry never succumbed completely, it waged so unequal a struggle that in 1883, only thirty-one years before the World War, the United States Census Bureau was compelled to report: "In undertaking the collection of returns it was discovered that no directory of the glass-works of the United States existed."

THE MAKING OF PLATE GLASS



1 Sand Mine is the Starting-Point

The plate glass window literally begins in a sand mine, such as the one at Crystal City, Missouri, here pictured. Here the siliceous sand deposited by the waters of some remote epoch is loaded into underground cars and hauled forth to be converted into utilities and luxuries for the modern world.



The Outside of the Sand Mountain

THE MAKING OF PLATE GLASS

THE manufacture of plate glass is one of the highly modernized industries, effectively equipped with labor-saving machinery and apparatus for accurate processing, and utilizing to the full the resources of chemistry and other sciences. The consequence is that polished plate glass of uniformly high quality has become an article of such common daily use that the public accepts it as a matter of course.

The making of perfect polished plate glass, however, remains one of the very difficult arts. From the raw stuffs through all processes to the finished product, the material is extremely sensitive. Chemical problems attend the melting of every batch. Produced in furious heat, the cast glass must support mighty cooling-stresses. If these are passed safely, many difficult mechanical manipulations are still to come.

Therefore the processes demand such painstaking care that the production of the

most modern plant, for all its great area and costly equipment, is astonishingly small. Thus the Ford City (Pennsylvania) plant of the Pittsburgh Plate Glass Company, which extends for a mile along the Allegheny River and is equipped with machinery of the very highest type, still turns out less than three carloads of plate glass a day. Plate glass manufacture is, first and foremost, a matter of quality, and all other considerations must take second place.

One of the fundamental difficulties in glass-making is the fact that an essential item of equipment, the "pot," or crucible for melting, requires years for its preparation and lasts only a few days in service. To understand glass-making it is therefore logical to begin with the making of this piece of equipment, for the glass industry must produce its own pots, owing to the care with which they must be treated and the long-term investments involved. The long



Pot-Making Must be Done by Hand

This slow, laborious, and highly-skilled process is one of the most exact operations in glass-making, for an air cavity or other slight defect in the thick clay walls might cause the pot to crack in the kiln with the loss of its valuable contents. With his hands the pot-maker forms rolls of clay and shapes the great receptacle with infinite care

THE MAKING OF PLATE GLASS



Pugging Machines Prepare the Clay

The selected clay is weathered for a year or two in order to disintegrate it and to eliminate impurities; then it is ground, screened, mixed with other ingredients, and subjected to a thorough kneading (or "pugging") in the odd-looking machine in the picture.

time required to produce a pot and its short life involve carrying an immense stock. In large factories as many as 5000 pots, each weighing 3000 pounds, are kept in storage, and the space thus occupied is formidable. These pots are made of certain selected kinds of clay. Each one is capable of melting one and one-half tons of glass at one



A Few of the 5000 Pots

In a single large factory as many as 5000 of these 3000-pound pots are held for months in storage to dry and season. The storage space required is very great; likewise the investment necessary.



Picturesque Avenue of Furnaces

One who has seen with his own eyes the subject of this picture is unlikely ever to forget it. In the gloom of the immense furnace hall the brilliant glow bursting from door after door in the long perspective of furnaces produces weird lighting effects and tells of the intense heat within.

THE MAKING OF PLATE GLASS



How Pots are Taken from the Furnace

Handling mechanism of great power and under absolute control is necessary to remove the pots from the furnace and convey them to the casting table.

time and of supporting a sustained temperature of from 2500 to 3000 degrees Fahrenheit through nearly one day and one night.

The work of making the pot begins three

years before it is to be used. The clays, after extraction from the mines, are exposed to the weather in order that they may disintegrate and eliminate impurities. This



The Dazzling Furnace Interior

From twelve to twenty pots are placed in a furnace at one time and there, for hours, subjected to the terrific heat of from 2500 degrees to 3000 degrees Fahrenheit. During this period the dry sandy batch becomes liquid glass. The costly pot can endure less than three weeks of such strenuous life.

PITTSBURGH PLATE GLASS COMPANY



Skimming the Melted Glass

The great tongs that have drawn this pot from the furnace are shown in the background suspended from a traveling crane. As soon as the workmen with their long-handled irons have skimmed the impurities from the surface of the shining fluid, the pot will resume its journey to the casting table.

THE MAKING OF PLATE GLASS

may require a year or it may take two, according to conditions. Then the selected clay is ground, screened, mixed accurately with certain constituents, and kneaded ("pugged" is what the pot-maker calls it) in pugging mills of various types.

After kneading, the clay must be stored again, to ripen, a process that often requires another six months. Then begins the slow work of forming it into a pot, which has to be done by hand. Hand-work is necessary because a slight defect, such as an air-cavity, would cause the pot to crack in the furnace, thus destroying its valuable contents. Therefore the pot-maker builds it up laboriously, making rolls of clay with his hands and forming the great receptacle layer by layer, with infinite care.

Even after it leaves the pot-maker's hands, the pot still is not an asset for immediate use. It must be stored for from six months to a year, in order to get final seasoning. When at last it reaches the "ready" stage, the pot is tested empty in a temperature approximating the glass-making heat. If it passes, it is filled with a batch. And then—its average active life is only twenty days!

In the terrific heat of the melting-furnace, which accommodates from twelve to twenty pots at a time, the fusing of the material so reduces its bulk that it becomes necessary to refill each pot three times, to insure a full pot of molten glass at the end. The expression "2500 to 3000 degrees Fahrenheit" will give the non-technical reader little conception of the intense heat required to fuse these refractory materials. To know what that heat really is, one should see the big pots glowing incandescent in the furnaces, each filled with almost blindingly luminous fluid.

As the melting reaches its critical time, expert workers maintain close watch over

the condition of each pot. With long iron testing-rods they draw out small quantities, so-called "gathers," as samples to show how the fusion progresses. Experience and quick decision are needed here, for at the exact moment of completed melting the heat must be reduced to prevent the formation of gas bubbles and to lower the temperature of the pot to a point where it can be approached and manipulated.

An electric crane now clasps the hot pot with a pair of mammoth tongs and lifts it through the door or "tuile" of the furnace. Workmen stand ready with long implements to skim the top of the molten "metal," swiftly removing any slag or other impurities, and another electric crane swings the pot over to the casting table, a great steel slab of two hundred tons' weight, thirty-two feet long by twenty wide. An ingenious device tilts the pot and pours its contents so that they flow over the full width of the table. This performance, which is known as "teeming," is of the utmost importance; it calls for skilled and careful operators, for an error at this stage, though slight, will affect seriously the quality of the glass.

A steel roller weighing twenty-five tons advances and rolls the molten mass flat. The thickness of the resulting plate is determined by gauges, steel strips on which the roller runs at the desired height above the table. Both table and roller are water-cooled to prevent warping under the great heat, and when the roller has completed its work, the mass which only a moment before was a white-hot fluid lies on the steel surface a red-hot sheet of glass, in area about the size of the table and approximately half an inch in thickness.

The glass by this time has cooled greatly from its original temperature, but still is intensely hot. This is a critical stage of the process, for if it were to remain only a few

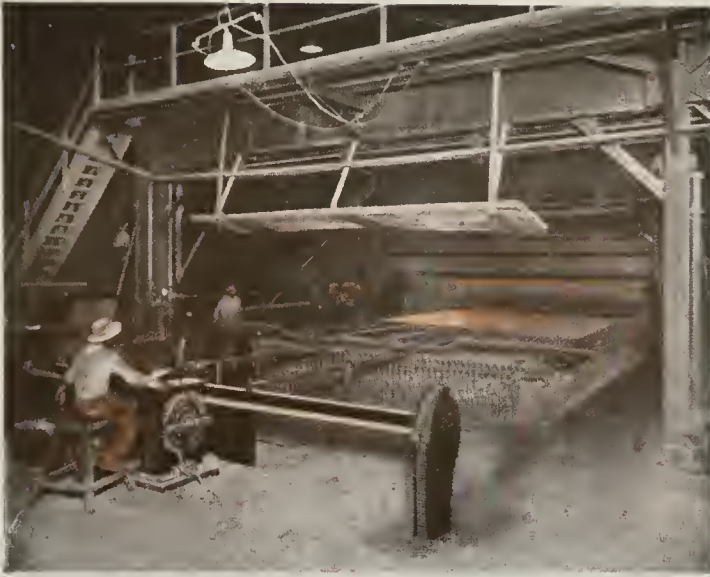
PITTSBURGH PLATE GLASS COMPANY



Where the Glass Becomes a Plate

Here is shown the most picturesque and critical moment in the process of making plate glass. Above this great water-cooled steel table (20 x 32 feet) swings the pendent, glowing pot; here it is tilted so that the contents pour in a thick, dazzling flood across the table's width, and immediately the 25-ton steel roller moves forward, spreading out the molten mass before it as a cook rolls out dough.

THE MAKING OF PLATE GLASS



The 300-Foot Lehr

This is the lehr, or annealing oven; through its carefully graduated temperatures the plate now seen to be entering will be moved and slowly cooled. In spite of all precautions, many plates develop fractures in the cooling.



Inspection at Mouth of Lehr

As the slowly-moving sheets reach the far end of this long, low tunnel, workmen carefully crawl out and with portable lights search the surface for cracks, imbedded stones, or other flaws. Every defect is marked with chalk for the cutters.

minutes in the temperature of the outer air, the sudden cooling would develop insupportable stresses. The plate must proceed, therefore, without the slightest delay to an annealing oven the temperature of which approximates its own.

This annealing oven, or "lehr" as it is known technically, is in effect a great tun-

nel, some eight hundred feet long. An electrical installation carries the glass plate through it very slowly — so slowly that it requires five hours to traverse the eight hundred feet. During this slow progress the plate passes under gradually reduced temperatures, minutely controlled. There is hardly a moment during the five hours



Rough Cutting to Eliminate Flaws

The cooled plates, with their rough edges and wavy surfaces, have now left the lehr and skilled workmen are cutting them down to get rid of the flaws marked by the inspectors. This greatly reduces the footage of finished glass, but is a necessary process.

PITTSBURGH PLATE GLASS COMPANY



Setting the Glass in Plaster for Grinding

Sheets of rough glass, suspended from overhead carriers, come swinging into place and are carefully lowered to lie flat on the tables. The workmen are seen tramping the glass into the wet plaster which covers the tables. This is to force out air bubbles. The plaster sets and holds the plates during the grinding.

THE MAKING OF PLATE GLASS



The Warehouse for Rough Storage

No wonder that the manufacture of plate glass calls for elbow-room! This immense building contains many acres of rough glass just as it comes from the cutting table. In its present condition it is available for floor lights, skylights, and similar purposes. When this product has passed through the operations of grinding and polishing, it becomes plate glass.

when a crisis may not occur, for any irregularity in the cooling may, and frequently does, produce an internal stress sufficient to shatter an entire plate.

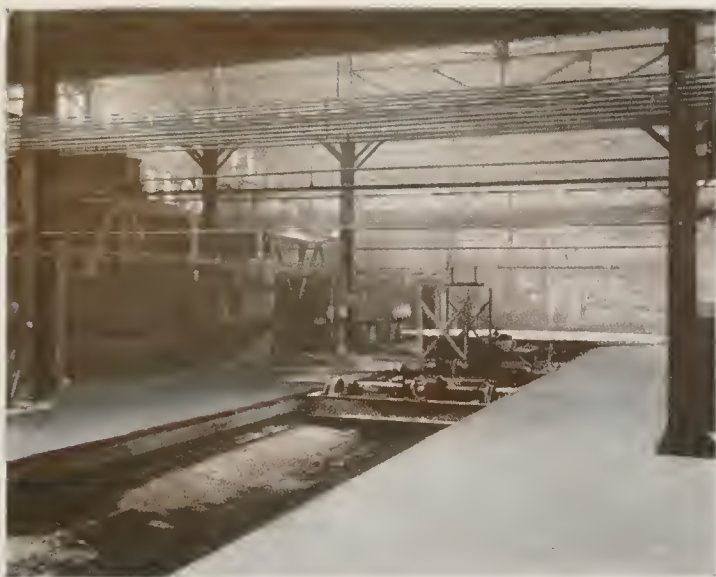
When the plate reaches the end of the lehr, it has become cool enough to handle and has acquired the requisite toughness. The workmen who here receive it are trained in the business of examining for defects that might cause the plate to break in the operations that are to follow. Any such defects must be cut out, and a large plate may thus be reduced to various sizes of what is called "rough stock," which is the common rough plate of commerce and is used for glazing roofs, for floor lights, for covering areas in sidewalks, and for other purposes where light without transparency is required. Before rough glass can be

transformed into clear polished plate glass, it must pass through the operations of grinding, smoothing, and polishing.

For the grinding operation the plates of rough glass are lifted by electric cranes and laid flat on huge circular steel tables covered with wet plaster of Paris that is to hold them firmly in place. Plates of various sizes are carefully fitted together, the large ones in the center and the smaller ones around them, till the table is covered. The tables, which are on wheels, then are towed by motor-car to a place beneath the grinders.

The grinding machinery is ponderous and costly in proportion. The tables that support the glass weigh seventy tons. The machines that rotate the tables cover an area of fifty square feet, measure more than fifty feet from base to top, and require motors of

PITTSBURGH PLATE GLASS COMPANY



Moving the Tables to the Grinders

After the glass has been set in the plaster the table thus covered is taken in tow by an electric transfer locomotive and conveyed to the grinders.



The Grinders are Ponderous

These mammoth disks slowly revolve upon the surface of the glass and with the aid of sand and emery gradually reduce the plate to perfect smoothness.

five hundred horsepower to drive them. The massive iron-shod runners that revolve over the surface of the glass to grind it have an additional combined weight of one hundred and twenty-four thousand pounds.

As the table begins to revolve, water and sand are fed under the runners, which are lowered slowly, almost imperceptibly, until at last their entire weight rests on the glass.

Under this powerful abrasive action the surface is ground with absolute uniformity, until all the irregularities in the rough glass have been worn away.

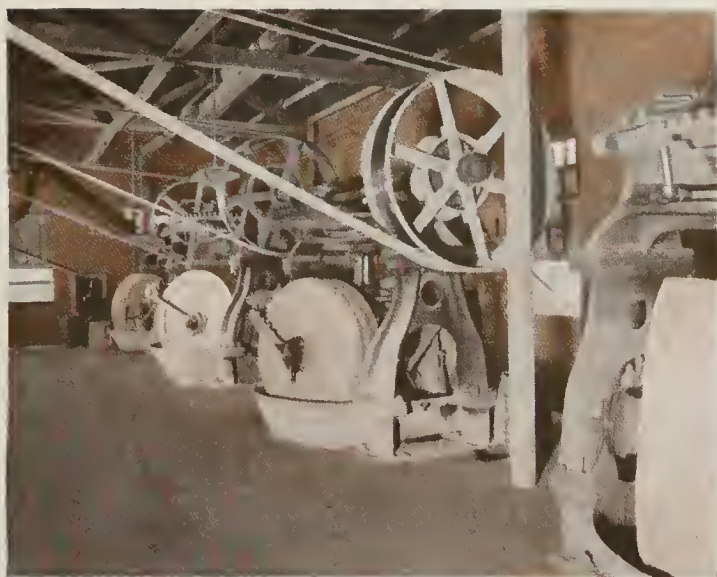
As the process continues, finer sands are substituted for the first coarse grades, until the work reaches the point where the finest grade of sand has been used. Then a finer abrasive, emery, is employed.



"Jointing" the Glass upon the Table

One surface of the glass is now ground but not yet polished. In the meantime it is moved to the "jointing yard" where it is washed, examined, and carefully inspected. Broken plates are replaced and loose joints are re-cemented.

THE MAKING OF PLATE GLASS



Grinding Emery

In this room, rough emery is subjected to hours of steady grinding in order to reduce it to the degree of fineness and smoothness required for work on glass.



Grading the Emery

Water flows gently through these rows of tanks. The emery is introduced in the top tank and its heavier grains sink, while the finer grains are carried on to the tanks below.

At this stage redoubled care is needed, for the work now has reached a point where the smooth surface is so far “processed” as to be readily liable to injury. It must pass through final stages of smoothing with emery of several degrees of fineness, which must be of the best attainable quality, and graduated with extreme care. One single particle of coarse emery, if it became mixed with the finer grades, would destroy the smoothness of a whole tableful of glass. Therefore the grinding and grading of emery, though very laborious, is one of the most important operations in a plate glass factory, in order to avoid scratches and imperfect polishing.

The completion of the grinding process has left the glass with a satin-like surface. Again the table-car is taken in tow by the transfer locomotive and is passed to the “jointing yard,” where the glass is washed and examined minutely. Broken plates are replaced and loose joints re-cemented, after which the table with its fragile burden is moved once more, this time to the polishing machine. In size and construction this mighty mechanism is similar to the grinding engine, but instead of iron shoes, it

carries many buffing-disks of felt, each about eighteen inches in diameter.

Once more the table is set revolving, and as the felt disks are lowered to the surface of the glass, a red oxide of iron commonly known as rouge, finest of all abrasives, is fed under them in the form of a paste. Under the slow rubbing of the revolving felts, the satiny surface of the roughly ground glass gradually takes on the brilliant polish of the finished product. This operation of polishing, although thus simply described, is by no means the least difficult of the processes in plate glass manufacture. Close attention and unerring technical skill are required to control the operation, so that there shall be continuous progress, without accident, or even blemish in the work.

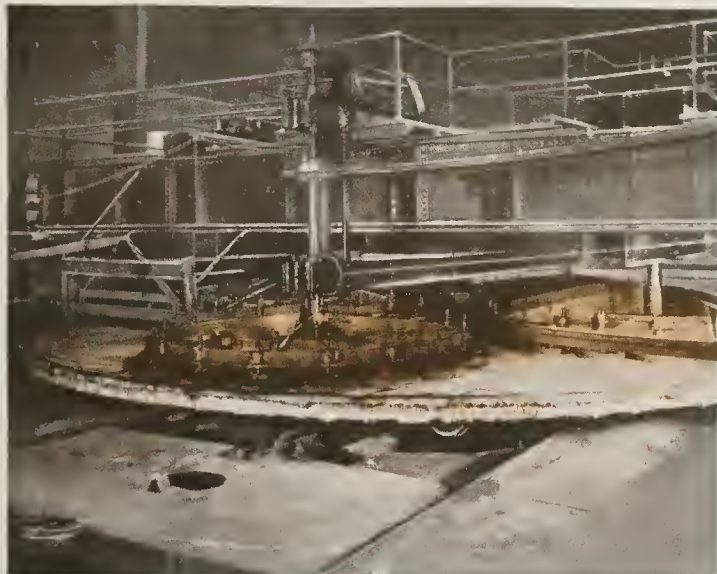
When at last the polishing of one side is finished, the side that has been imbedded in plaster remains to be done. Again the table must resume its journey, therefore, going first to the “laying yard,” where the plates are lifted from the plaster, turned, and re-laid; then to the grinders and smoothers; and finally to the polishers. When this finishing work is concluded, the table is



Cleaning off the Plaster

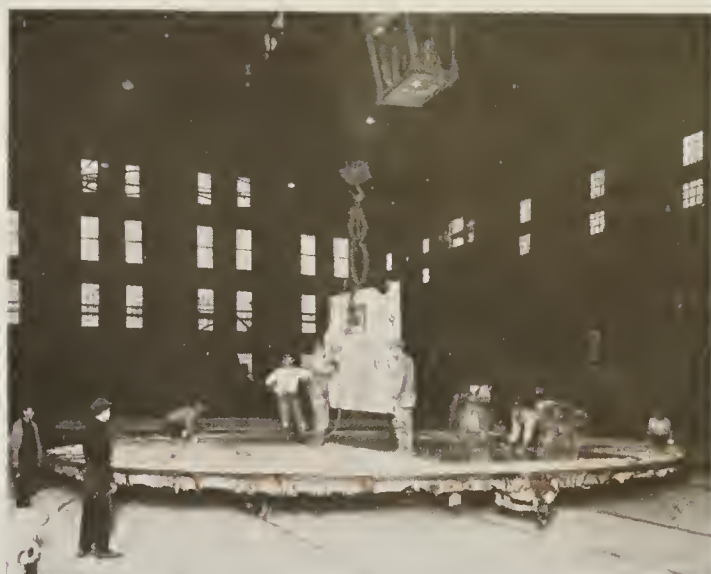
After "stripping," the glass plates receive a bath in muriatic acid in order to remove all the adhering plaster of Paris. This leaves them clear and brilliant.

THE MAKING OF PLATE GLASS



Where the Glass Receives its Polish

Revolving felt-covered disks, with the aid of red oxide of iron, or "rouge," give the glass its final polish.



The Process of "Stripping"

The table on wheels having completed its journey, the plates must be released or "stripped" from the plaster bed.

taken to the "stripping yard," where the polished plates are loosened from their plaster bed for good and all.

In releasing the plates from the plaster investment the utmost care is necessary. To avoid scratching or other accidental spoilage, the plates must be turned on edge, and in that position they are transferred to the wash-racks.

Here a bath of muriatic acid removes all adhering plaster of Paris; careful washing

follows; then a painstaking examination for any defects that may have escaped the eyes of the inspectors during the operations of grinding, smoothing, and polishing. When the glass has passed these inspections it is a clear, polished plate ready for use — just such a sheet as may be seen in shop windows everywhere. Its original thickness when it went to the grinding machines, about half an inch, has been reduced one-half by grinding and buffing, and the brilliant product



The Final Cutting and Elimination of Defects

In this strong light, inspectors search for defects that have escaped previous examinations; then trimming and squaring give the glass plates their final form.



Storing the Finished Plates

Here, carefully set on edge, are racked the polished plates which have passed successfully the preceding operations and inspections and now are ready for shipment.

PITTSBURGH PLATE GLASS COMPANY

represents even a smaller proportion of the original quantity of raw material that went into the melting-pots.

Of the original batch of material, about thirty per cent is volatilized and lost in gaseous form during melting. Almost fifty per cent of the rough plate is ground off and washed away in the finishing operations, while a loss of approximately twenty per cent is caused by breakage during machine operations or by rejection, for various defects, in the final inspections.

When the glass is delivered to the ware-room after having been cleansed of all

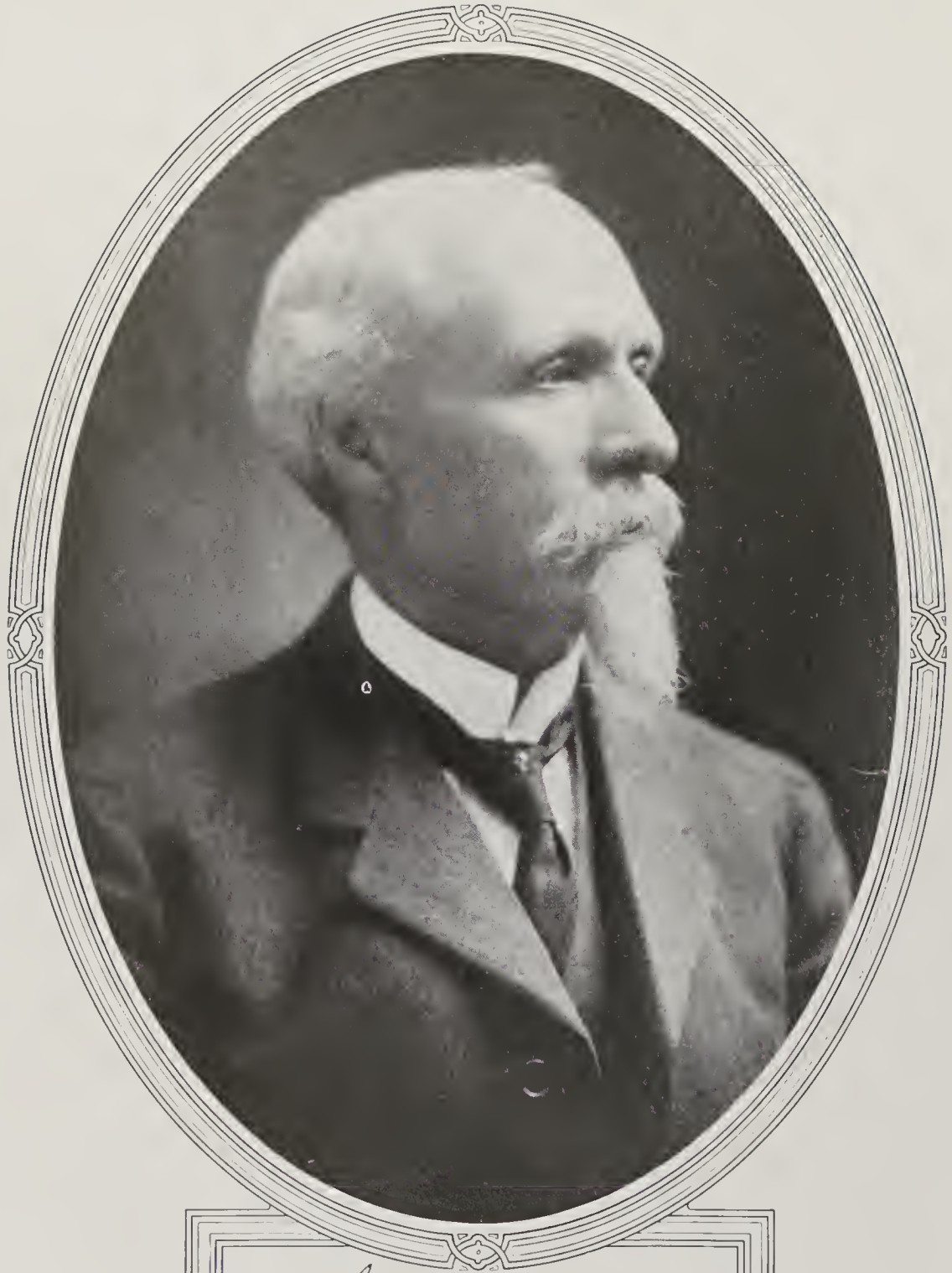
plaster and dirt, it is scrutinized by cutters, men experienced in eliminating any small remaining defects. This elimination can be done only by cutting, which means the reduction of a plate to smaller sizes. Areas that do not contain defects are shipped out to jobbers as stock sheets, or are reduced to sizes for which the factory has orders.

The polished plates now have assumed their final form. From the examination frames and cutting tables they are conveyed by traveling crane to the packing room, where they are boxed and shipped to the markets of the world.



Packing and Shipping

PLATE GLASS IN AMERICA



John Pitman



PLATE GLASS IN AMERICA

UNTIL comparatively recent times, the history of plate glass manufacture in America was a chronicle of just such failure and loss as attended the early efforts to make common glass. Every attempt to introduce the industry swallowed up all the money that was put into it. The first undertaking of any consequence was at Cheshire, Massachusetts, in 1850, but after having resort to many expedients, including the removal of the plant to Brooklyn, New York, the enterprise failed in 1856.

Again hopeful men raised money and revived the undertaking at Lenox, Massachusetts, under the name of the National Plate Glass Company, only to meet with like disaster. Members of this organization then induced other men to join them, Theodore and James Roosevelt of New York City being among the number, and formed the Lenox Plate Glass Company in 1865. Costly equipment was installed, with much machinery from England, and decided improvement in product was attained. Among other services the science of polishing was advanced greatly. After only six years, how-

ever, this determined and energetic effort failed as had all that preceded it.

Business men of New York, Boston, Philadelphia, Chicago, St. Louis, Detroit, and Louisville had reason in this period of American development to rue connection with plate glass manufacturing enterprises, for the money invested and lost aggregated many millions.

Up to 1880, not a piece of plate glass had been made in the United States without loss to the manufacturer; all money invested had vanished without result.

But suddenly, in the early 'eighties, the situation showed a remarkable change. By 1884, according to the statement made in that year at tariff hearings in Washington, the cost of plate glass to the American consumer approximated only one-half of what it had been before 1879. It was evident that the United States no longer need be helplessly dependent on the glass-making science of Europe, for American workmen had been trained to produce plate glass of transparency, clear color, and polish equal to any that had been imported.

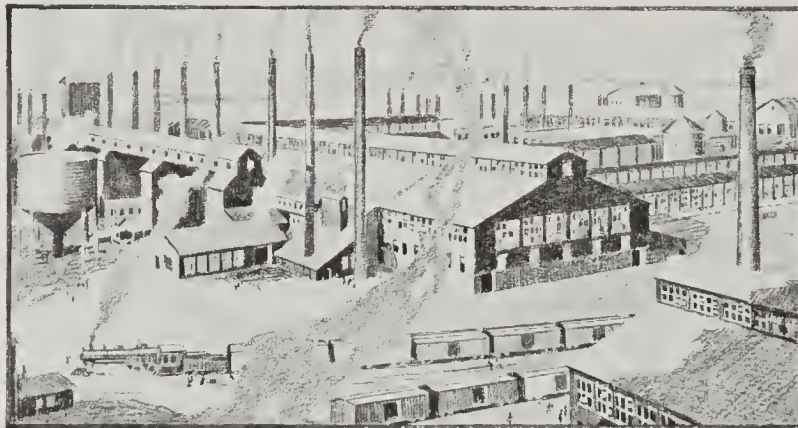
PITTSBURGH PLATE GLASS COMPANY

This bewildering industrial revolution had come to a business which only so recently as 1880 had employed altogether fewer than 1000 workmen. According to the census of that year, the plate glass establishments of all America employed only 956 hands and paid out in wages during the year only \$292.253, with a total annual product of only 1,700,000 square feet, of which more than ten per cent was charged off as destroyed during manufacture.

Contrasting these figures with the annual productive capacity of 48,000,000 square feet of high-quality plate glass now attained by the Pittsburgh Plate Glass Company, we have a graphic and impressive demonstra-

tion of how, in these United States, in much less than the average lifetime, vast opportunity has opened out before those with the vision and the energy to grasp it.

Nor is it accidental that the comparison between the past and the present should have this Company for its central element: for it was the inception and development of the Pittsburgh Plate Glass Company that gave the impetus to native glass-making. Where forty years ago American manufacturers could not make a single plate of glass in successful competition with foreign glass, today it is this American organization that stands as "the largest manufacturer of plate glass in the world."



BEGINNINGS AND DEVELOPMENT OF THE PITTSBURGH PLATE GLASS COMPANY

WHILE the struggling establishments in the United States, handicapped by insufficient equipment, want of experienced labor, and inexpert technical management, still were making valiant but futile endeavor to produce plate glass in competition with the far more highly favored foreign manufacturer, an American prominent in Ohio River steam navigation, Captain John B. Ford, determined to enter the field. He had visited the existing American plants, had made study of American methods, and had gathered detailed information from such European workmen as he found employed in the United States.

Fortified with all the knowledge available, Mr. Ford induced a few men to join him and ordered from Europe the best machinery obtainable for grinding, smoothing, and polishing, those being the operations that had presented the greatest difficulties.

Pending the arrival of this equipment, a factory was completed at New Albany, Indiana, and to that city belongs the distinction of being the first in the United States where plate glass manufacture was carried on continuously and with any measure of success. But this early and partial success was won only in face of many trials similar to those which had wrecked all previous undertakings. First of the calamities was a fire that completely destroyed the new works just as the imported machinery was beginning to arrive. Another factory

was built at once, and the investors had the courage to erect it on a scale much larger than that of the first unlucky venture. Some success attended it; but, in the words of the Census Report of 1880, it "had to undergo the reverses that seem the fate of all plate glass houses in this country."

Undiscouraged, Mr. Ford again gathered willing associates, foremost among whom was John Pitcairn, then an officer of the Pennsylvania Railroad, and this group, under the name of the New York City Plate Glass Company, built a factory at Creighton, Pennsylvania. On this same site today stands "Works No. 1" of the Pittsburgh Plate Glass Company, to which style the New York City Plate Glass Company changed its corporate name in 1883.

Difficulties were by no means at an end. Skilled glass-workers were so few that heroic efforts were required to increase the number to meet conditions of growth. Delays in getting machinery were beyond all reason. Capital was almost unobtainable. But the leaders in the enterprise had grasped the fundamental principle that *plate glass cannot be manufactured successfully on a small scale*—that the very best technical knowledge available must have behind it the bold investment of large capital.

Foreign competition continued to be serious, and each solution of technical or business problems seemed to be followed by new ones more difficult; but by 1895 it appeared

PITTSBURGH PLATE GLASS COMPANY

to Mr. Pitcairn and his associates that beyond question plate glass manufacture as a native industry could be made to succeed. The old formidable problem of quality had been solved; American-made plate glass was equal to the imported article; and continuous improvement in process gave satisfactory assurance for the future. The problem of establishing the industry on a business basis equally secure had still to find its answer. The experience of the past, however, foreshadowed the solution: economy of production was to be the secret of prosperity, and the only way to attain to this in the necessary degree was by that great fundamental economy which is involved in maximum quantity production.

Here was a policy that once more called for large investment of capital. Factories at Ford City and Tarentum, Pennsylvania,

already had been added to the original plant. The Company, by reorganizing and procuring an increase of capital stock to the total amount of \$10,000,000, succeeded in acquiring additional plants at Charleroi, at Duquesne, and at Walton, Pennsylvania; at Elwood and Kokomo, Indiana; and also at Crystal City, Missouri.

With mastery of process secured, and highest standards of quality firmly grounded in its own native traditions; with every manufacturing cost reduced by quantity production to its lowest terms; with a system of distribution approved by success and full of promise for steady growth in usefulness, the enterprise of making and marketing American plate glass, as exemplified in the development of the Pittsburgh Plate Glass Company, may be said to have reached its permanently successful period.



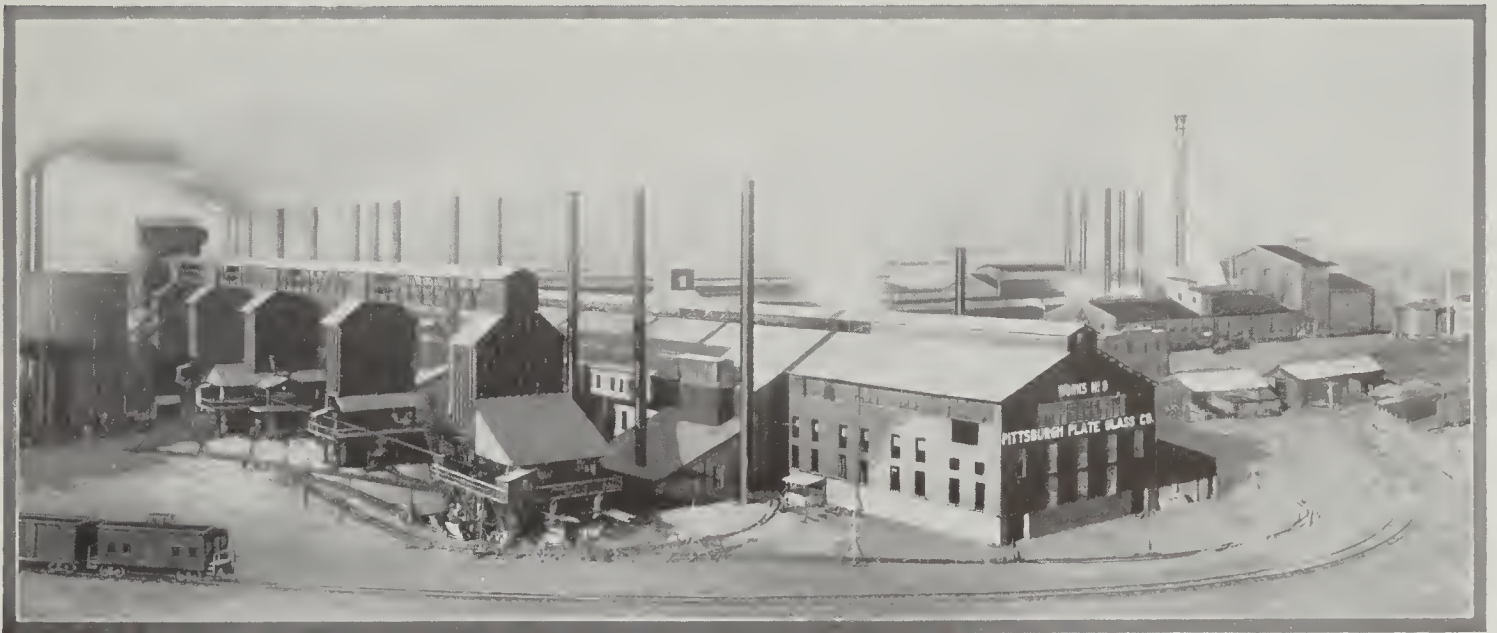
Ford City, Pennsylvania

Stretching for a mile along the banks of the Allegheny River at Ford City, Pennsylvania, are the numerous buildings which constitute the largest plate glass plant in the world.

THE PITTSBURGH PLATE GLASS COMPANY TODAY

THE economies in the manufacture of plate glass introduced up to 1896 had so well proved their efficacy that it was logical to seek like economy in distributing the product. In that year, accordingly, the present great system of distribution had its beginning, with Warehouses in seven cities: New York, Boston,

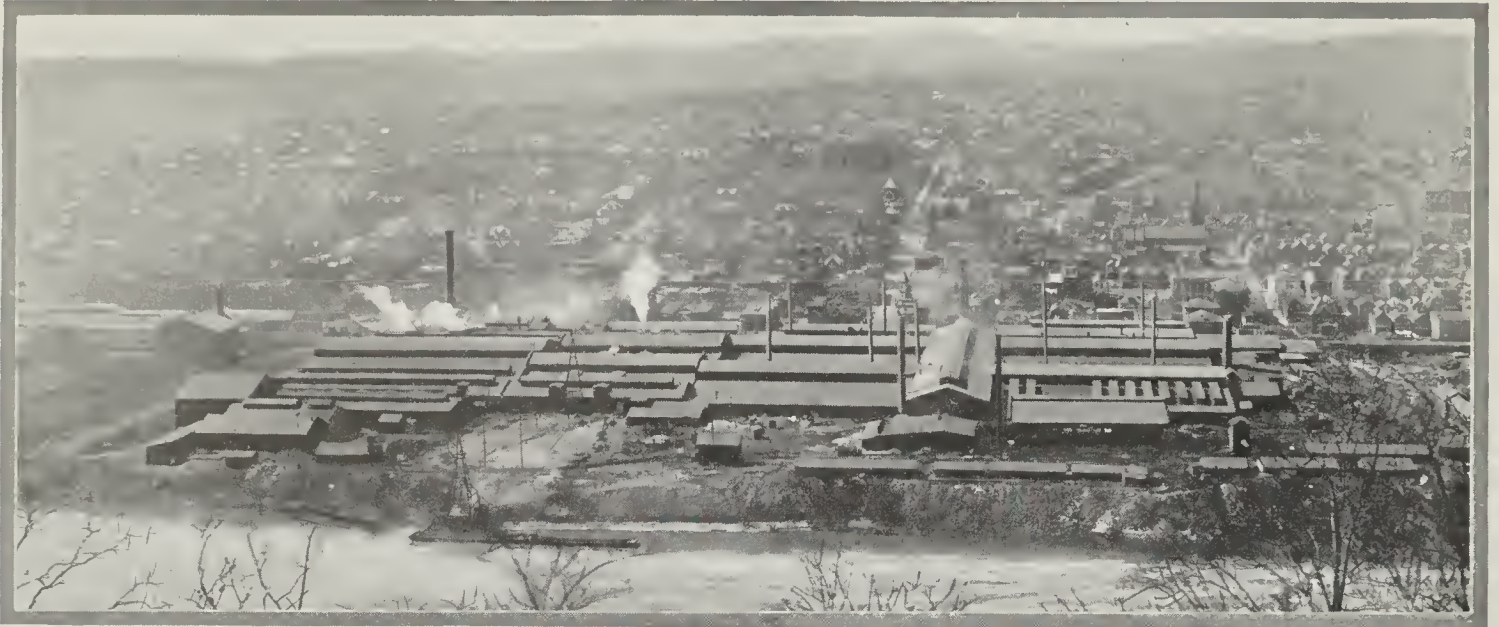
Cincinnati, Detroit, St. Louis, Chicago, and Minneapolis. Today, forty-two Warehouses are maintained throughout the United States, in all of which expert service is available and large stocks are carried, for immediate delivery. These Warehouses have benefited both producer and consumer by assuring instant supply, and



Crystal City, Missouri

Another plant of the Pittsburgh Plate Glass Company devoted exclusively to the manufacture of plate glass.

PITTSBURGH PLATE GLASS COMPANY



Charleroi, Pennsylvania

One of several plants of the Pittsburgh Plate Glass Company which make Carrara and heavy plate Black Glass.

by eliminating long hauls have minimized breakage. They also have done much, by their wide representative activity, to educate the public to the almost infinite usefulness of glass.

An almost unavoidable economic necessity, coincident with the institution of national distributing centers, was an enlargement of the Company's field of glass production, which until then had been limited to polished plate glass.

From time to time after this date, the Company extended its scope, until today the glass products of the Pittsburgh Plate Glass Company

comprise polished plate glass, bent glass, mirrors, leaded glass, Carrara and Black Glass, and window glass. Other forms of glass, also, not manufactured by the Company, are handled by its Warchouses, giving them a complete line of glass, interior and exterior, for buildings.

It became apparent at an early date that the building trade would gladly look to a unified source of supply for certain lines not related to glass as a manufacture, but, like glass, important in building construction. Notable among these were paints, varnishes, and brushes, which



Kokomo, Indiana

This plate glass plant of the Pittsburgh Plate Glass Company is located not far from the center of population of the United States.

THE PITTSBURGH PLATE GLASS COMPANY TODAY



Creighton, Pennsylvania

Works No. 1 of the Pittsburgh Plate Glass Company. Erected in 1883, the Creighton plant is the second plate glass plant established in the United States.

for a long time had been sorely needed in standardized, reliably uniform kinds and qualities. To insure steady, prompt supply, as well as dependable quality, the Company decided, in 1900, to take over the business of the Patton Paint Company, Milwaukee, Wisconsin. Shortly afterward it added the brush factory and business of Rennous, Kleinle & Company, Baltimore, Maryland. The welcome accorded these extensions of service necessitated rapid enlargement. A paint and varnish factory was established at

Newark, New Jersey, to serve the Eastern United States and the export trade. Various other manufacturing units were added, among them the Pitcairn Varnish Company, Corona Chemical Company, and the Red Wing Linseed Oil Company.

These increases of business have compelled successive heavy increases in capital investment. In 1902, the capital stock was increased by cash subscription to \$12,500,000. In 1906, cash was again obtained in a sum sufficient to bring the capitalization to \$17,500,000. Four years later,



Clarksburg, West Virginia

One of the window glass plants of the Pittsburgh Plate Glass Company.

PITTSBURGH PLATE GLASS COMPANY



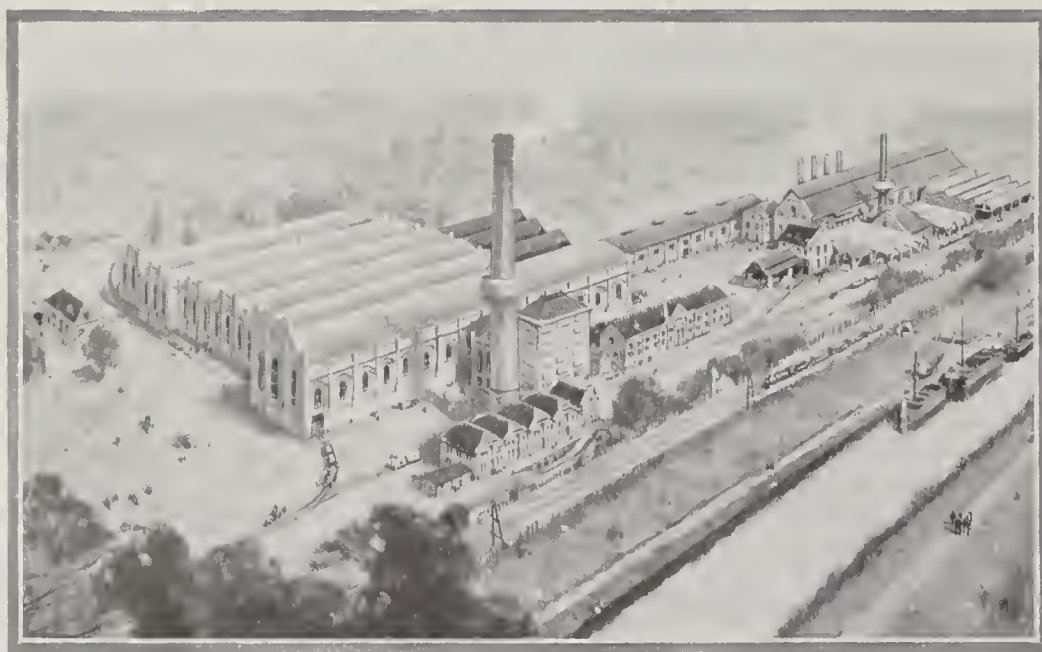
Mount Vernon, Ohio

Another plant of the Pittsburgh Plate Glass Company devoted exclusively to the manufacture of window glass.

in 1910, the capital stock was increased, also by cash subscription, to \$22,750,000, and, in 1917, by stock dividend, to \$25,000,000.

On October 5, 1920, the stockholders unanimously approved the Consolidation Agreement adopted by the Directors to bring under the one corporate name those companies theretofore subsidiary to, and now united with, the Pittsburgh Plate Glass Company. In this consolidation is

included the Columbia Chemical Company, producing soda ash, caustic soda, calcium chloride, tanners' alkali, and lime fertilizer, some of which are used in glass-making. The plant is at Barberton, Ohio, and the limestone quarries near Zanesville, Ohio. This consolidation resulted in an increase of the Company's capital stock to \$37,500,000, which later was increased to \$50,000,000.



Courcelles, Belgium

This is the plant of an independent corporation, the capital stock of which is owned by the Pittsburgh Plate Glass Company. During the World War it suffered so severely that it has been rebuilt.

PLATE GLASS AND COMMON GLASS

COMMON glass, by a strange inconsistency, usually is known by the trade term "window glass." While common glass, as a matter of fact, is used in millions of windows, that is not its proper function. Common glass *never should be employed, provided plate glass is obtainable, in any position where the glass is intended primarily for clear vision.*

Glass for windows, show cases, or similar use must be practically invisible in order that it may not interfere with the image that lies beyond; that is to say, it must be free from the bubbles, waves, and streaks generally found in common glass. Plate glass alone gives this freedom. The two kinds do not, in strict fact, compete one with the other. Just as there is a difference in price between steel and iron, and a sound economic reason for using steel for certain purposes and iron for others, irrespective of price, so there is an equally sound basis for choice between plate glass and common glass.

Each of these two kinds of glass has its particular usefulness for certain purposes. The buyer whose selection is influenced unduly by the matter of price, begins at the wrong end. Decision as to the kind of glass to be used must be made in the first instance according to its fitness for the purpose.

There are many cases in which the use of common glass is perfectly good economy; but it is not good economy to wrest it out of its broad and legitimate field by endeavoring to use it for a service which it cannot perform so well. Wherever the nature of a case indicates plate glass to be desirable, the buyer may feel, with full confidence, that it will be also the most economical.

GLASS AND EYESIGHT

CHARLES F. PRENTICE, PRESIDENT NEW YORK
STATE BOARD OF EXAMINERS IN OPTOMETRY

A window-pane that is directed to the open and liable to be looked through should not contain striations, bubbles, or other obstructions to the normal use of accommodation and its intimately associated, ever-shifting lines of binocular fixation. It is obvious that highly polished plate glass is the only glass possessing the essential properties to conserve vision. In short, that which most appeals to the eye is also best for it.

GEORGE W. McFATRICK, PRESIDENT NORTHERN
ILLINOIS COLLEGE OF OPHTHALMOLOGY

A glass fulfilling this condition should be a clear, white glass having no striations, bubbles, or strain in its make-up. It should have perfectly parallel surfaces, and they must be ground and polished, perfectly, so that each ray of light will pass through without being deflected from its proper course, exactly as if no glass were placed between eye and object.

The cheaper flowed glass can in no way fulfill these conditions, as it is only by grinding and polishing its surfaces that this condition can be approached. Plate glass fulfills these conditions as no other glass can, and there is no question that the majority of people will demand its use when these facts are called to their attention, and they appreciate what a harmful effect imperfect glass will have upon their most precious possession, their eyes.



A Striking Contrast

This wall show case, with common glass in the upper section and plate glass below, tells its own story.

PITTSBURGH PLATE GLASS COMPANY



Dangerous Track or Common Glass?

This view, as seen through the second window, appears to indicate a very dangerous condition of the tracks. However, the left-hand or plate glass window shows these same tracks lying smooth and even. It is evident, therefore, that a window of common glass is what causes the distorted image.



Distorted Vision

In this picture, the window marked "X" is open, but in the others common glass transmits a distorted image.



True Outlines

Here the same view is seen through plate glass. A little reflection is noticeable, but no distortion of the view.

GLASS IN TYPICAL MODERN BUILDINGS -

EXAMPLES OF THE UNLIMITED USES OF PITTSBURGH PLATE GLASS COMPANY
PRODUCTS FOR BOTH UTILITY AND BEAUTY AS ILLUSTRATED BY THE
FAMOUS WOOLWORTH AND EQUITABLE BUILDINGS IN NEW YORK

TALLEST of the world's inhabited structures, the Woolworth Building in New York City, lifting its cathedral beauty seven hundred and ninety-two feet in air, faces all the winds. Its observation gallery is a lone peak. No rampart, natural or artificial, is near enough or high enough to wall off the storms. At its base are the sea, mother of tempests, and the Hudson river valley, highway for northern gales.

As one looks down the dizzy precipices of its sculptured sides they seem aerial in grace; but behind that dainty garb of marble, carved limestone, and moulded terra cotta, is a massive chording of steel beams, plates, struts, braces, flanges, and diagonals that defy the storms.

"The huge height and the wind-load," says one of its builders, "developed enormous stresses and necessitated the use of huge columns and mighty girders."

The Woolworth was indeed built for enormous "wind-loads." Yet the immense structure is pierced from base to summit with apertures that seem innumerable, where there is neither steel nor stone, but only a thin, transparent material. There are five thousand such apertures—five thousand great windows of plate glass, each with two panes, thus making ten thousand "lights" that must withstand the same winds that beat against the walls.

A theorist (especially if familiar with the blasts that volley through New York's canyons) might logically imagine a stupendous annual breakage. He will acquire unexpected information if he seeks out the man who knows all about the complex edifice from its nethermost caisson, one hundred and ten feet underground, to its summit, which is exactly one inch higher than the figure already mentioned. This is what Edward A. Cochran, superintendent of the great pile, says about the annual breakage of exterior plate glass lights.

"Our replacements do not amount, all told, to two dozen lights a year. The breakage is practically all above the sixth floor. This figure is for all exterior lights, including our great expanse of store-front windows, most of which are of bent plate glass."

Even in the old days of buildings that modestly hugged the earth, the architects of such cities as New York and Chicago had to give some consideration to wind-pressures; but they dealt with mere zephyrs compared with what men had to face when they began to rear their cities into the air instead of spreading them over the earth's surface. The architects of New York's mammoth structures figure on pressures that are titanic; they build against winds of eighty and one hundred miles an hour. Yet fully a quarter, and probably a third, of these precipitous surfaces is glass. And it serves.

LARGEST OFFICE BUILDING IN THE WORLD

Not far distant from the Woolworth, and looming high among the skyscrapers which form the picturesque sky-line of lower Manhattan, is the great office structure of the Equitable Life Assurance Society of the United States. The largest office building in the world, noble in its mere bulk as in its architectural beauty, its forty stories contain one and one-quarter million square feet of rentable floor-space.

Of the vast wall-area of the Equitable Building, one-third is Pittsburgh plate glass. There are 5700 windows, all polished plate glass, set and hung in balanced metal sashes. With such proportions of glass in modern buildings, it is easy to understand the importance of using the kind of glass that, besides its value for practical utility, is supreme in beauty, and thus plays perfectly its part in combination with the costly marbles and terra cottas that enter so largely into these structures.

PITTSBURGH PLATE GLASS COMPANY



A Tower of Light

The Woolworth Building, the tallest inhabited structure in the world, rears its majestic height almost eight hundred feet above Broadway—a sight never more impressive than when at night the light shines from its myriad windows of Pittsburgh plate glass.

GLASS IN TYPICAL MODERN BUILDINGS

Not to be content with the fullest admission of daylight through exterior windows, the builder of today knows that it is essential that every ray of this natural light deliver utmost service throughout the interior. Light is the one natural gift which, after being used and used again, still passes on, undiminished in value, to other uses. All that it requires is unimpeded passage.

So the delightful interiors of such buildings as the Woolworth and Equitable, no less than their outer windows, are supplied with glass in vast amount; and the beauties of pattern that glass permits give it genuine part in the decorative scheme.

The entrance to the thousands of offices in the Equitable Building, for example, are practically of solid glass. The 2500 high office doors are all of Pittsburgh Plate Glass Company chipped plate glass, each door consisting of only a steel frame with a great piece of this lustrous glass set in, unbroken by sash or other disturbing element. Perfect for the transmission of light to interior rooms and corridors, and still giving complete privacy, this beautiful plate glass serves as nothing else could.

Without such glass, dark or dim corridors in the modern office building would impose a continual expense for artificial illumination. This is entirely obviated by the simple method of "borrowing" the daylight that streams through the exterior windows, and by means of glass doors, glass partitions, and interior wall windows, letting it pass on to continue its service in the halls and corridors beyond.

In all these architectural triumphs, glass is not restricted to locations where it serves simply

for transmission of light. Its superior qualities of hardness, light-reflection, lustre, and cleanliness give it unique serviceability as structural material pure and simple. Thus in the Woolworth Building, on which was lavished every art that adorns, glass was a main reliance for brilliancy in decoration. As Cass Gilbert, the architect, said on its completion: "The wise

liberality of the owner provided that the structure should be enriched and beautified so as to give pleasure to the millions of people who will see it."

As in building the great ecclesiastical edifices of olden days, all the crafts were called in—mural painters, sculptors, modelers, carvers, gilders, workers in copper and iron. It is, indeed, a merited tribute to glass that in this unhampered quest of the beautiful, glass was not merely a material selected here and there or by chance, but that all the arts and crafts found it absolutely essential. The whole design of the fine Gothic entrance of the Woolworth on Broadway rests on the use of glass. The glory of the dome ceiling in the



The Equitable Building has 5700 Windows

arcade, so noble in color and design that it rivals the best mosaic work in Europe's famous churches, is due to glass—to two and one-half million separate "tesserae" or bits of stained glass, that make a radiance of color as if precious jewels thickly set were sparkling overhead. One cannot go anywhere, from the basements to the sixtieth story, without finding glass in some form, charming the eye while it renders its useful service.

Even in such utilitarian parts of the building as the lavatories, glass of various kinds enabled the builders and embellishers to maintain the

PITTSBURGH PLATE GLASS COMPANY

same high standard of dignity and elegance that distinguishes more pretentious features of the building. Here is employed a form of glass which, as purely a structural material, has come into wide use, in modern office buildings and other structures, as paneling for the walls of rooms and corridors—the Pittsburgh Plate Glass Company's famous product, Carrara Glass. Beauty, sanitation, permanence of surface finish, and economy of maintenance were the considerations that led to the selection of Carrara Glass for the lavatories of the Woolworth Building after an exhaustive study of all other materials.

MODERN LIGHTING REQUIREMENTS

Since it is out of the question, from considerations of privacy, to rely upon exterior lighting for lavatories and toilet rooms, modern architectural design seeks first of all maximum brightness. All surfaces must be white, to reflect the light. In addition, the white surface must be impervious; it must not absorb moisture; and it should have a surface that will not be subject to accidental or deliberate defacement. Most polished white mineral surfaces, such as marble, fall short in these particulars and require periodic refinishing.

Carrara Glass alone meets all requirements. Hard, burnished, permanently white, bright, unstainable, defying malicious injury with lead pencils or fluid, it has the richness of costly marble. The Woolworth Building management, in describing in a publication the spacious toilet rooms on practically every floor of the building, says: "The walls of these rooms are lined with white Carrara Glass, the sanitary and most attractive wall decoration known for this purpose." All the walls are lined to a height of eight feet with this material, which after years of service exhibits the same brilliant appearance as in the beginning, unmarred, undefaced, and unstained. There has been no slightest deterioration, and the ease with which it is kept clean has made Carrara Glass one of the great permanent economies.

Carrara Glass is used for wainscoting and partitions in one hundred and eighteen rooms in the Woolworth Building, as follows: ninety-five toilet rooms, thirteen janitors' closets, the barber shop, and nine miscellaneous rooms. Approximately 53,000 square feet of Carrara Glass was used in the building, of which 38,000 square feet

was three-quarters-inch thickness, polished one side (for wainscoting), and 15,000 square feet one-inch stock, polished both sides (for partitions). There are about 750,000 lineal inches of ground edges, 50,000 lineal inches of polished edges, and 10,000 drilled holes. Eighteen freight cars were required to transport the glass from the factory.

The immense ground-floor corridors of such buildings as those under consideration are to all intents and purposes public thoroughfares. Equitable Building records show that more than 125,000 people pass through its many entrances daily. The general practice in such buildings is to make these corridors bazaar streets. In the ground-floor passageways of many large buildings the visitor finds himself in aisles of plate glass, which are the show windows of shops that thus front on an arcade instead of on the public street. On the street frontage, likewise, plate glass store fronts are the rule. The show windows which form the lower frontage of the Woolworth Building are designed with plate glass bent to curves, giving an effect in strict harmony with the general architectural scheme.

SOLID PANELS OF MIRRORS

Within these shops, in like manner, recourse is had to plate glass, for brightness and cleanliness, and to show merchandise to best advantage. For counters and table tops, for show cases and display wardrobes, nothing but plate glass will serve, while plate glass mirrors set in handsome patterns as paneling along the walls complete the picture of elegance.

In the great barber shop in the basement of the Equitable Building, the walls are predominantly of mirrors, and the partitions, wholly composed of plate glass mirrors, mitred and beveled, contribute a strikingly ornamental effect. The various desks and tables have spotless white Carrara Glass tops.

In the Woolworth Building barber shop a similar solid paneling of mirrors forms the four hundred feet of walls. In the Turkish bath and swimming pool adjoining, plate glass encloses the hot-room and steam-room, so that they are in effect transparent cases, through which attendants may keep occupants under careful observation.

Somewhere in the archives of the Equitable and Woolworth buildings are statistics as to the

GLASS IN TYPICAL MODERN BUILDINGS

number of individual plate glass mirrors that are structural parts of the buildings—over washstands in offices, in lavatories, and in spots where they serve as decoration or for lighting effects multiplied by reflection. No one ever has taken time to compute just what area they would cover if all were put together; but one statistician has calculated that the beveled plate glass in the mailchutes of the Equitable and Woolworth buildings, if the panels were laid end to end, would extend much more than a mile; while another patient mathematician says the glass of all kinds in the Woolworth Building would make a generous canopy over Madison Square, New York's famous open place that occupies more than four city blocks. Nor is that all: the tenants of the offices have added their quota of plate glass in desk tops, book cases, and the like; the various offices of the Equitable Life Assurance Society alone would furnish impressive figures; the great banking institution that occupies the lower floors of the Woolworth Building has writing-shelves, deal-plates, and other tablets of heavy plate glass wherever one turns; and in the rooms occupied by the administrative and executive staffs of the

building, every office desk has its plate glass top. Throughout the remainder of the building no fewer than 3000 private desks are so equipped.

GLASS ENDURES HARDEST WEAR

A significant fact that develops in any study of great office buildings is this: that the parts subjected to the most incessant and indeed the hardest wear are wholly or mainly of glass. Thus, we find that sixty-three elevators in the Equitable Building and twenty-nine in the Woolworth, operated on a headway calculated in seconds, have their doors glazed with polished wire glass. So with office partitions, which, with their constantly swinging doors, have to endure the hardest kind of usage: these nowadays are built in by the management of each building for its tenants, and in practically all modern structures such partitions are of steel, with chipped, sandblasted, or other obscure or patterned glass set in to give privacy while conserving light.

In both these buildings polished plate glass, as well as the chipped, is much used for this interior service. In the Equitable Building there are in all about 25,000 feet of partitions.



For Private Offices

Plate glass partitions are now widely used for dividing large spaces into individual offices. Thus privacy is assured in each office while natural light is carried to the interior rooms and halls.



The Beauty of a Plate Glass Window

Plate glass has many beauties. Sometimes, because of its mirror-like surface, it brings the charm of a reflected landscape into the wall in which it is set; and always, as one looks out from within, it shows the landscape as a picture in a frame. The charming photograph reproduced herewith is that of a library window in the Theology Building of Emory University, Atlanta, Georgia. By an interesting coincidence both the reflected and transmitted views are shown in the one picture and each is remarkably clear. Common glass used here would have distorted these images and disfigured a beautiful building.



The Private Conservatory

For the purposes here shown there is no satisfactory substitute for polished plate glass. This illustration shows how bent plate glass may be used to give added beauty and distinction.

ADVANTAGES OF PLATE GLASS IN BUILDING

IN THE Woolworth and Equitable building examples just cited, the special structural values of plate glass—its beauty, clarity, durability, adaptability, resistance to wind, sanitary quality, and the variety of surface patterns available—are set forth. These qualities have led architects to specify plate glass more and more freely, so that today it is employed frequently in place of such materials as wood, plaster and metals, with little expense for replacement and practically none for upkeep.

Beauty, in a structure large or small, is a very substantial consideration in the appraisal of value. Architects and builders very generally recognize this, and for great industrial and office buildings are using plate glass to an extent undreamed-of a few years ago. Home-builders as a class, however, are far from realizing as they should how much brighter, more comfortable, more sanitary, and more beautiful in outward appearance their dwellings may be made by judicious use of plate glass.

The average man building a residence is quite certain to specify minutely the wood for floors and trim, the heating and lighting fixtures, and even the hardware for doors, windows, and cupboards. But when it comes to the glass through which, twelve months in every year, he is to get his view out-of-doors, he takes that for granted. Yet the dwelling that is glazed with plate is immediately enhanced in value. It is better to live in and easier to sell. Not only are plate glass windows a comfort to the occupants, but for the very reason that they are a somewhat unusual refinement, they give character and tone to a residence, conveying the impression that all its appointments must be of like elegance.

This superior value is attained with astonishingly small difference in cost, as between common window glass and plate glass. In the case of dwellings ranging in cost complete from \$2,500 to \$10,000, the outlay for plate glass windows would represent only from \$30 to \$150 more than for common window glass. Plate



The Appropriateness of Plate Glass

It is impossible to imagine the owner of such a residence as this permitting the use of anything but plate glass in its windows. To disfigure its beauty with panes of common glass would be an offense against comfort and good taste.



Glass-Enclosed Porte-Cochère

The canopy that protects from rain gains in beauty by the use of obscure glass, while the crystal clearness of the plate glass walls enclosing the entrance is one of the most attractive features of the house.

glass is used almost exclusively in England, and as a matter of economy, in workingmen's cottages and in even the smallest homes.

Thus the showing, even on the straight comparison of mere cost, is altogether favorable to plate. But a further advantage makes the actual money difference still less. This is its durability. Plate glass windows are stronger. They withstand shocks, impacts, and sudden wind pressures that would shatter a weaker glass. Another weighty advantage involved by the general use of plate glass in large buildings in our cities is the security of pedestrians. The risk of injury by falling glass has been largely eliminated.

All glass, whether common window or plate, is of course non-inflammable and to that extent in many ways a safeguard against fire. But plate glass is more than simply non-inflammable: it is fire-resistant. Heavy plate, set in metal framing, has been found, by actual practical

ADVANTAGES OF PLATE GLASS IN BUILDING



Daylight Illumination

Plate glass, clear or obscure, solves many problems of interior lighting in large buildings. In this sectional view of the Union Arcade of Pittsburgh the interior walls and doors of the offices are almost wholly of plate glass, principally of the chipped or sand-blasted varieties, thus admitting daylight from the exterior but insuring complete privacy to the office tenants.



The Sun Parlor

In no room of the home is it more important that plate glass be used for glazing. Clarity, strength, and beauty are the essential qualities required in glass for such purposes.

PITTSBURGH PLATE GLASS COMPANY



Serving a Double Purpose

These pictures strikingly illustrate how an ingenious architect solved a difficult problem by the use of plate glass. The long corridors of the Missouri State Capitol building are lighted by means of artistic plate glass windows in the upper walls of the adjoining rooms. Thus the glass is made to serve the twofold function of beauty and utility.



experience, to be far more of a fire-resistant than most persons would suppose. Thus from the viewpoint of fire-hazard alone the glass partition or wall has every advantage over wood. Besides being ornamental and conserving light, it will not burn. In competition with strictly fire-proof materials plate glass may well be used where the importance of light outweighs a minor fire-hazard.

Some form of plate glass will be found to adapt itself to any glazing purpose, interior or exterior, and in harmony with any scheme of trim. For partitions and other interior construction where angles are undesirable, the Pittsburgh Plate Glass Company makes bent glass that lends itself to practically any conceivable design. It is made in many degrees of curvature and imparts an elegance that can hardly be obtained in any other material or with equal economy.

So great is the versatility of plate glass that architects and decorators are constantly working out new adaptations, some based upon the

ADVANTAGES OF PLATE GLASS IN BUILDING



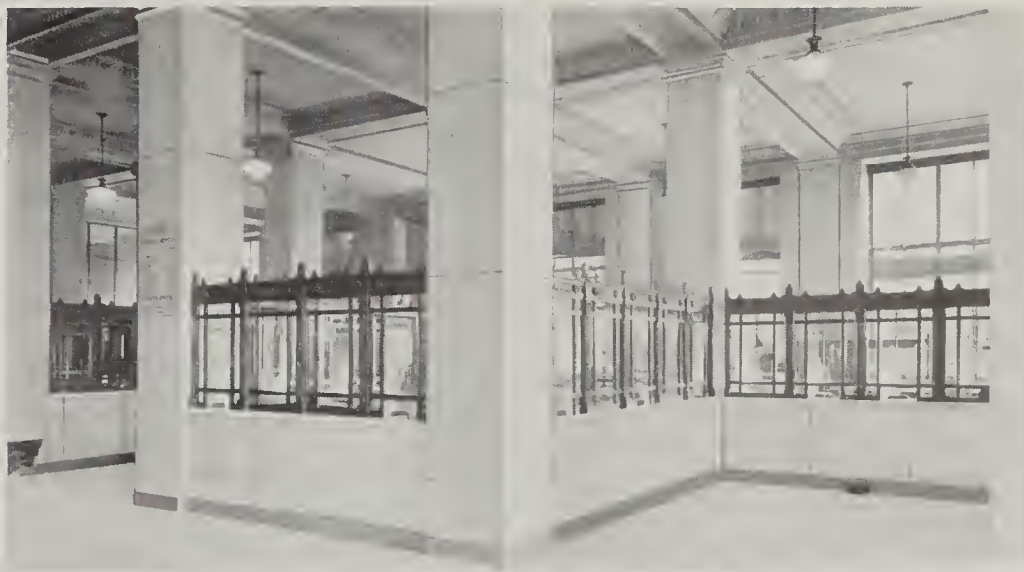
The Modern Bank

Plate glass, leaded for decorative windows, polished and beveled for doors and tellers' windows, polished and rounded for tellers' deal-plates, wall-desks, and stationery partitions, falls naturally into place in the modern bank interior, where severe elegance is a requisite, and orderliness is the "first law."

thought of decorative beauty and some upon strictly structural or sanitary considerations.

Windows which look out upon scenery are being called more and more into play where

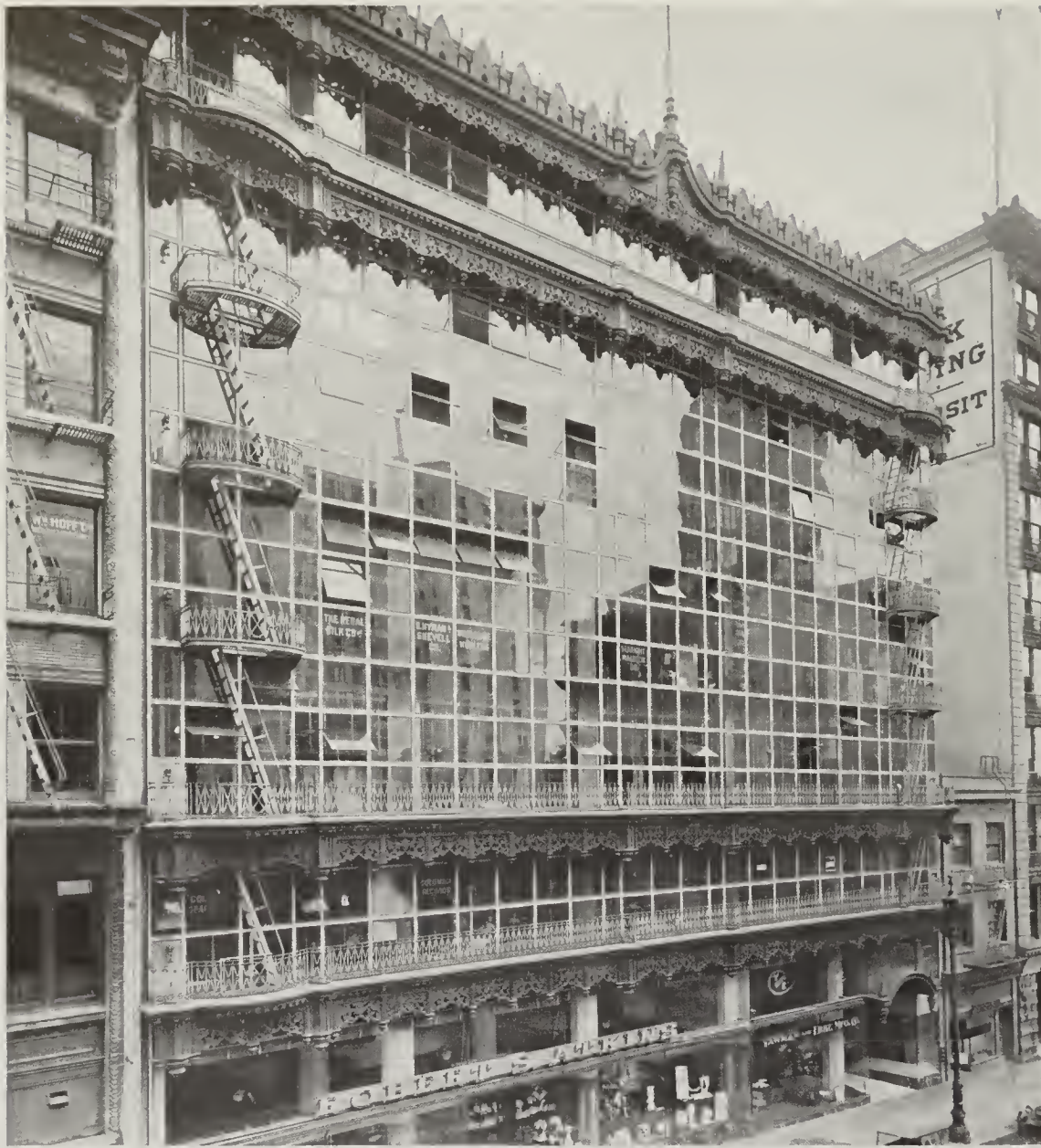
it is desirable to break wall space in a decorative way, without hanging pictures. The ever-changing view through the window-panes in itself is a picture beyond the skill of any artist.



Bank Partitions

Many beautiful and artistic effects are secured in bank interiors through the combination of clear or obscure plate glass and ornamental metal work.

PITTSBURGH PLATE GLASS COMPANY



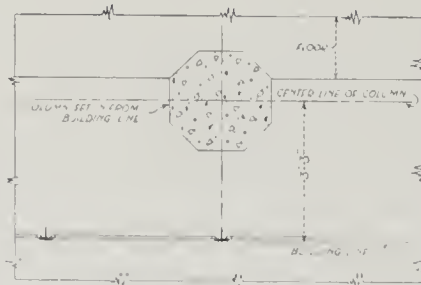
An All-Plate-Glass-Front Building: The Hallidie Building in San Francisco, California

Any discussion of the importance of glazing with plate glass would be incomplete without mention of the triumph of an all-plate-glass-front building, which secures maximum interior illumination by eliminating, so far as possible, every obstruction to the free entrance of daylight. The illustration shows how the Hallidie Building, recently constructed in San Francisco, in its street elevation has practically a one hundred per cent glazed surface.

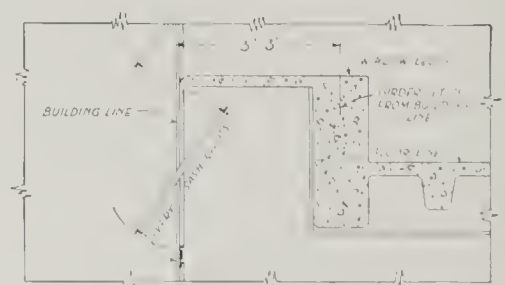
The chief elements embodied in the design are the structural details and the architectural treatment of the elevation. The construction, which was relatively simple, has been accomplished as shown in the plans below. The center lines of the columns and the spandrel girders are located 3 feet 3 inches inside the building line, and the skeleton of the structure is entirely free from the front wall. At the floors, the spandrel girders extend 2 feet 2 inches above the floor line. The connection between stories is cut off by a thin concrete slab which extends from the girders to the building line. In order to secure proper ventilation and permit washing of the glass, the sash of the all-metal framework is side-pivoted. The treatment of the fire-escape is novel, giving to the elevation the effect of flanking pavilions.



Elevation



Plan



Section

MIRRORS



The First "Moving Pictures"

Long before the day of the cinema, millions of mirrors were showing the lifelike moving images of all that passed before them. The subject of this view without doubt is well aware that the mirror will hold a beautiful picture so long as she stands before it.



A SHORT HISTORY OF THE MIRROR

BEAUTY never has been without her mirror. Nature gave the first woman crystalline pools from which her reflection smiled at her. With man's first mastery of materials, a way was found to polish stones and metals sufficiently to produce a reflection. Long before the glass mirror was made, there were mirrors of burnished steel and silver. Never would the Queen of Sheba, Helen of Troy, or Cleopatra have been content to know only from the lips of their admirers how dazzling were their charms.

The Greeks and Romans of the Middle Ages apparently knew the means by which glass might be made to reflect perfect images; but though Aristotle wrote that "while metal or stone must be polished to serve, glass or crystal must needs be lined with metal to cast back an image," they probably were content with their metal makeshifts, for we can find no record that they made any others. Early glass was not, in fact, sufficiently transparent for use in mirrors.

Indeed it was not until about the Eleventh Century that glass mirrors were produced. The Venetians, naturally, figure prominently in this early manufacture, for they were leaders in the art of making all kinds of glass. But they were not the only possessors of the knowledge of mirror-making. The archives contain a petition by three Venetians, about 1300, seeking permission to sell certain materials which they had on hand because a German mirror-maker had broken his agreement with them.

In 1507, Andrea and Domenico del Gallo obtained a twenty years' privilege as the sole

makers of mirrors in Venice, asserting that they possessed a secret then known only in one German works. No specimen of their craft is known to exist but every collector dreams of finding one; for, strange as it may seem in the case of so fragile an object, some mirrors have survived through the centuries, and a few in almost their full original beauty. Indeed, a good mirror, whether of the past or of today, is one of the very enduring articles. In this respect, America may properly be proud of its mirror-making prestige, for, barring accident, an American plate glass mirror may remain unimpaired in beauty and usefulness for generations.

About 1560, a guild of mirror-makers was formed in the city of Venice. So highly was the art esteemed, that its practitioners often were knighted, and many were carried into the higher nobility. From this it is seen that the mirror-maker was regarded not as a mere workman but as a creative artist of high rank.

Venice practically monopolized the field until the latter years of the Sixteenth Century. From that time on, the literature and records of many countries show references to the widening industry. In 1664, Sir Robert Mansell, of London, wrote about making, grinding, and foiling. The last-named process, so pre-eminently important, had been greatly improved by that time.

The original method had been that of applying a thin sheet of tin amalgam to the glass. This marked an immediate and striking improvement upon the polished steel or silver mirror, but it was far from giving the wonderful reflec-

tion of our modern mirrors. Venetian workers originated a method of attaching reflecting foil to the glass by means of an amalgam of mercury. This gave the mirror a back practically indestructible, but the method has been superseded by the present form of mirror, as mercury is far too expensive in this day of widespread demand for mirrors.

The mirror as we know it is, as a matter of fact, a genuinely modern development. It was about 1865 when the chemical method of depositing a coating of silver on glass was discovered. This remains the basic process for present-day mirror-making, but it has been progressively improved and it seems safe to predict that while further technical modifications may be made, they will be merely in the line of manufacturing method; in so far as concerns the production of mirror quality, the process is eminently satisfactory.

The French are entitled to the honor of having discovered this method, and for many years they had the unquestioned monopoly of fine mirror-making. A "French plate" mirror was the only kind that a person of any consequence would think of owning. Even after plate glass manufacture had struggled to the position of an assured American industry, France still remained pre-eminent in this field. But in recent years, as a direct result of the ascendancy of American plate glass, the United States has won supremacy in the mirror-making field also. To-day this country is acknowledged to be the producer of the finest mirrors in the world, as to the quality of both glass and silvering.

It is a source of deep satisfaction to the Pittsburgh Plate Glass Company that its long battle for the plate glass industry has included among the fruits of success this signal achievement.

THE MAKING OF PLATE GLASS MIRRORS

AN ARTICLE in another part of this volume, describing the methods of grading plate glass, explains that all plate glass turned out by an efficient organization is manufactured by the same process and that the differences in grade are established by critical selection after the glass is finished in the works.

The plate glass selected for mirror-making ("silvering quality," in technical language) must be of the very highest grade in surface and structure, because the silvered back accentuates every defect almost as if it had magnifying power.

Only very limited areas in any given sheet of glass are selected by the Pittsburgh Plate Glass Company experts as being of the quality demanded by the mirror department. An uncompromisingly high standard in this regard, and undeviating adherence to it, decide the quality of mirrors. It is true that such rigid selection makes necessary a considerable amount of waste through cutting out rejected portions; but the processes of mirror-making are elaborate, and it is sound economy to use, from the outset, only the finest material for the work.

The first process in making the mirror is the beveling of the edges, if it is to be beveled.

After beveling comes the process of silvering. This cannot be done until the glass has been put through a most radical process of cleaning, among other things passing under machines for the removal of dirt and scratches.

The formula for the silvering solution is almost uniform throughout the world, but the application of the principle presents innumerable details of technique, manufacturing system, and resource. Shop management, equipment, the experience and skill of the workers, and many other practical, everyday considerations determine the quality of the mirrors that are turned out by any establishment.

No glass can be silvered satisfactorily if it is dirty; but the definition of "dirt" may and does vary as widely as the term can be stretched. While in many industries a washing with ordinary water might be considered an ample cleansing, plate glass that is to be prepared properly for silvering must be washed with distilled water. The Pittsburgh Plate Glass Company's definition of a clean glass surface is one that is *chemically clean*. The distinction is important, for the silvering process is a chemical process and not simply mechanical. The ingredients are sensitive and give good results under none but the

THE MAKING OF PLATE GLASS MIRRORS



The Mirror Receives Its Silvering

Someone has likened the pouring of the silver solution upon the sheet of plate glass destined for mirror-making to the pouring of pancake batter upon a griddle.

most favorable circumstances. From the moment of cleansing, the washed plate must be protected scrupulously from any fresh soiling—even so much as a little dust. The mirror-maker who intends to maintain uniformly his standard of excellence must provide a silvering room that is dust-free. The washed plate is brought into such a room and placed on a blanketed table equipped with devices for warming the plate to a uniform temperature of from 90 to 100 degrees Fahrenheit.

When the workers have assured themselves that the plate is in every way ready, a solution of nitrate of silver is poured carefully over it. A reagent, added to the solution before pouring, begins to operate in a few minutes and precipitates the silver on the glass, leaving the liquid on top, where it serves to exclude air from the silver, thus preventing its oxidation.

When the precipitation is complete, the plate is dried. A preservative coating of shellac is spread over the silver and over that is painted a weatherproof coat of mirror-back paint. This completes the processes involved in making a modern plate glass mirror of the highest grade, known to the trade by the standard name of "patent-back mirror."

The purpose of the coats of shellac and paint is to protect the film of silver from moisture or abrasion, and extreme care must be taken to preserve intact these protective coats. When the mirror is set in place, provision must be made



Drying the Newly Silvered Mirrors

These mirrors have been silvered, as is shown in the preceding picture, and now are lying on the silvering table in order that the metallic silver may be precipitated.

to prevent moisture from condensing on the painted back of the mirror. An air space between the back of the mirror and the walls always should be provided, and this space should be such that some circulation of air can be assured. Mirrors never should be exposed to extremes of heat or cold.

The silvering is assumed to be good for at least one year, but there is no reason why a mirror, which originally is made properly, should not remain in perfect condition for many years under the conditions found in the average home, if it is properly protected from moisture, and the protective backing is preserved from damage of any kind.

If the mirror is not properly set, and is subject to moist conditions, the moisture eventually will penetrate to the silver coating and cause oxidation of the silver, which shows on the surface of the mirror as minute black spots that gradually spread, as oxidation develops, until the mirror presents an unsightly appearance. This damage will appear and develop much more rapidly should the protective paint coating be damaged in any way.

A mirror which has become oxidized, or "spoiled," can be made practically as good as new by removing the silver and treating the glass as in the original silvering process. This will restore only the silvering; any scratches or defects in the glass will remain. This point will be found more fully discussed on page 206.



The Three-Panel Mirror

The beauty of this form of treatment is obvious. It accords well with the architectural features of the room.



The Large Mantel Mirror

In the room above pictured the unusual size of the mirror area adds greatly to the apparent spaciousness of the room.

THE MIRROR IN THE HOME

IN THE cultured civilization of today the mirror is far more than a mere looking-glass. It is one of the most beautiful objects produced in all the development of man's æsthetic faculties, and in our time it is coming into its rightful place. No longer is it restricted to places and occasions where we use it simply to see our own image. The gratifying increase in public understanding of beauty and ornament has encouraged and enabled architects and interior decorators to place mirrors for other purposes.

While every use of a mirror depends on its property of reflection, the kinds of reflection to be gained are innumerable. A mirror may be so hung in an interior as to reflect a bit of landscape outside. Thus used, it is a picture, and a picture within the reach of any purse. It may be hung to reflect a color, in order to make the "spot" so dear to the artist on a wall needing such a touch. It may be used to "catch" daylight and thus brighten a part of the room that otherwise would be lifeless; or it may serve to give brilliant



The Horizontal-Panel Mirror

A familiar use of the mantel mirror in which it has its highest value as a looking-glass as well as for wall decoration.



Mirrors in a Mantel

This shows a very attractive use of mirrors in a mantel. The unused grate area is made to reflect the room.

THE MIRROR IN THE HOME



Types of Wall Mirrors

Upon this page are shown three of the many types of wall mirrors in ornamental frames. Such mirrors are particularly effective as reflecting backgrounds for plants, statuettes, vases, and other ornaments.

reduplication of artificial lights. A room that is "squat" can be relieved by cunning use of a single mirror, if one of the right shape be hung in exactly the right place. A room that seems

too short or too narrow will gain in appearance of spaciousness if a mirror be placed at its end or opposite the entrance. A mirror of correct proportion hung between two windows at the end



An Effective Dining-Room Mirror

The glass here shown is contrived to form an integral part of the scheme of decoration.



A Gold-Framed Mirror

This superb frame and the glass it encloses are in perfect accord with chair, lamp, and console table.

PITTSBURGH PLATE GLASS COMPANY



Mirrors in a Millinery Shop

A millinery shop is made attractive by its mirrors no less than by its display of headgear, and the two are inseparable. Such interiors as the one here pictured present attractive vistas of reflecting surfaces and, still more to the purpose, enable the purchaser to try the effect of the hats. It is probable that the mirror is the principal sales-person in such transactions.

of a narrow room will make an amazing change and will convert an uninteresting or even unpleasing apartment into one that has the indefinable charm of "style"; for style, as the artist knows it, is a matter of touches like this.

There is no easier or simpler way to give distinction to a hallway. This, the first place to be

entered by guest or owner, too often is sombre or at least unattractive. Most halls are too small for pictures or for the effective use of other decoration, but no hall is too small, or too unpretentious, for a mirror. It is always appropriate, always an improvement; in a dark hall or on a dark stair, it is more than an ornament; it dispels



Mirrors in Dressers and Wardrobe Doors

A dresser must have a mirror, and if this be supplemented by a full-length glass in a near-by door, as shown above, all toilet purposes are served. In some cases it adds to the architectural effect to have the door made of plate glass mirrors in small panes, set in a sash effect as shown in the smaller picture.

THE MIRROR AS A LOOKING-GLASS

gloom. A statuette or similar object gains immeasurably when a mirror of appropriate size is placed immediately behind it. There is no more exquisite thing than flowers with a mirror for background. A corner too low for a picture, too small for any other use, instantly is lifted from its nothingness by such a bit of polished and silvered glass.

A mirror is a thing to use deftly, with sensitive appreciation of fitness. A single mirror in one room may be just right, while two or more would "fight each other." But another room may gain distinguished character by a number

of mirrors so disposed as to send a play of beauty flashing around the walls. In the average dwelling there is not a room that cannot be improved by at least one mirror in the right place.

Mirror frames may be of the utmost simplicity, or they may be in themselves a part of a scheme of lavish decoration. In many cases, as in tiled bathrooms or in paneled or otherwise fancifully decorated apartments, it may even be effective to use them with no frame at all. Indeed, the adaptability of the mirror for ornament is so unlimited that a volume might be written on this one theme of interior decoration.

THE MIRROR AS A LOOKING-GLASS

THE successful establishment of plate glass manufacture as an American industry, which has made plate glass, formerly a luxury, now a practical, common, everyday utility, has done more than that: it has brought into well-nigh universal use the full-length plate glass mirror.

Within the memory of the elder of the present generation was a time when a full-length "French mirror" was a precious thing indeed, and its possessor envied—and also eagerly visited by callers who "just dropped in" for a moment to have a look at themselves. Those were the simple days. Today the most unpretentious home can afford even a pier glass, and it is not merely the woman of fashion who requires the facilities of self-inspection: the well-groomed man thus serves his self-respect rather than his vanity, while the deft-fingered woman who has the knack of gowning herself finds the full-length mirror not only a convenience but a very practical home economy.

Coincidentally with its wide use, there have come many ingenious ways of placing these large mirrors. Whereas the old-fashioned mirror was either a so-called pier glass or else a glass hung on a large and cumbersome stand, the large mirrors of today are set where they are neither in the way nor inconvenient. For example, a most economical and attractive method of our time is to set mirrors in the doors of wardrobe cupboards and similar closets in bedrooms, boudoirs, sitting and sewing rooms, and so on. Sometimes they are on the outside of the doors, if the scheme of decoration makes this arrangement suitable. At other times they are on the inside,

a method much used where there are small children who in their play might scratch exposed mirrors.

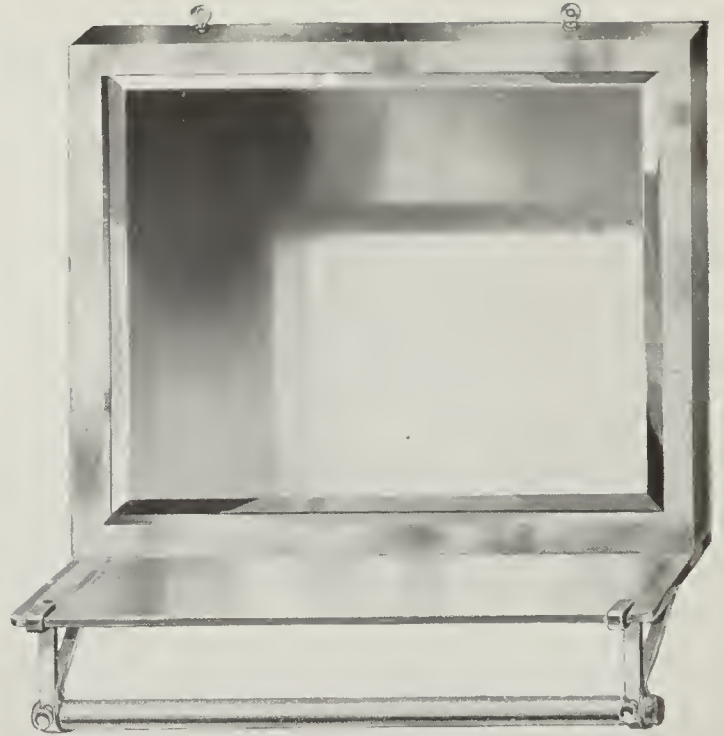
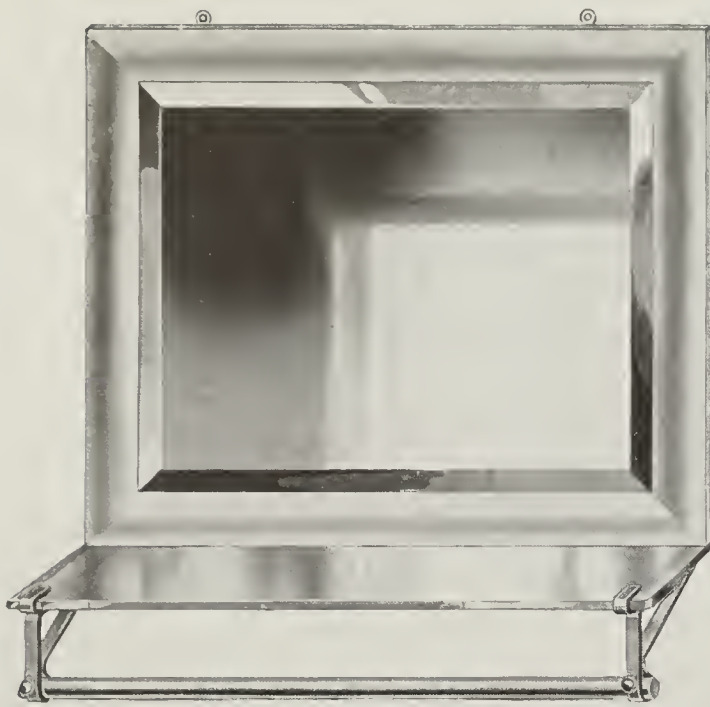
A strikingly beautiful way of using a full-length mirror for the combined purpose of looking-glass and decorative element, is to set it at the end of a long front room or of an upper hall. In a room with two doors that face each other directly or approximately so, a full-length reflection in each door enables women to study their costumes from all angles. Such an arrangement, moreover, almost always increases the illumination.

MIRRORS IN BATHROOMS

In the bathroom the correct use of mirrors will make a permanent saving in the artificial lighting bills. Too often the attempt is made to make shift with a single mirror in this room. This almost always is a mistaken economy, for there are very few bathrooms where the same mirror will be equally serviceable for both natural and artificial light. Therefore, whenever a single mirror is used, it necessarily is placed with reference to the artificial light, for otherwise it would be useless after dark. The consequence is that there are surprisingly many bathrooms with plenty of natural light but with the mirror so placed that even in the brightest morning it is necessary to use artificial light.

There is hardly to be found a bathroom that will not benefit in comfort and economy from at least two mirrors, one for use with natural light and the other with artificial light. In a house

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Lavatory Mirrors

Plate glass mirrors have prominent place in all well appointed lavatories. In some cases they are made adjustable as to position, a considerable convenience in shaving.



THE MIRROR IN FURNITURE



Mirrors in Bathroom Cabinets

The obvious convenience of having a mirror inserted in the door of the cabinet which hangs before the wash-basin has made its employment almost universal.

where there are several men, it is a convenience to have a shaving mirror in addition, either alongside a window or over the bowl, so that two men may use the room simultaneously.

The bathroom walls, being either tiled or of special material, lend themselves well to mirrors permanently set in. They may be used with or without frames according to circumstances.

The reception room in every dwelling should

have a mirror primarily for use as a looking-glass, since every woman desires to be sure that her costume is in perfect order before her hostess greets her. This little provision for the comfort of guests often saves the household from the fuss of taking visitors upstairs. It is also a decided convenience to the women of the household by permitting them to get a last glimpse of their apparel before going out.

THE MIRROR IN FURNITURE

THE mirror in furniture serves two purposes—for pure decoration or for use as a looking-glass. In the bedroom, dressing room, and boudoir, its primary utility is that of a looking-glass, which suggests its use in wardrobe doors, also on dressing tables and bureaus, where, as a rule, the mirror is most serviceable when so arranged as to be adjustable in various positions.

In the dining room, on the contrary, the mirror as a back for the sideboard and the china closet or glass cabinet is to be treated entirely as a part of the decorative scheme of the room. Its property of reflection in these cases should be studied with direct reference to the silver, porcelain, and glass. The reflection is for the purpose of enhancing the beauty of these objects by bringing out their full grace and lustre. The

correctness of using mirrors in such furniture has been recognized in all periods of art. It is one of the distinguished modes of ornament.

The same principle applies to the glass cabinets in drawing-rooms and reception rooms for the little objects of art that always have been a favorite and appropriate element in the furnishing of such apartments, where a general effect of formal elegance is quite correct and justified.

If the bookcases in the library are glazed, as they should be to protect the volumes against dust and injury, mirrors may very well be substituted for glass to hide shelves the effect of which is unsightly, either because they contain books with damaged or otherwise displeasing backs, or because they have to be used for preserving necessary but unattractive and untidy



Dressing Tables

A dressing table without mirrors is unthinkable and the value of setting the two wing-mirrors at an angle to the center glass is one that needs no argument with any woman. The designs here pictured are merely two of the infinite variety of mirror applications for this purpose.

pamphlets and similar literary material. The remedying of such bad spots in the library often adds marked brilliancy if the arrangement of mirror doors is judicious and harmonious.

The use of transparent plate glass tops for furniture has become one of the standard methods for preserving and beautifying and at the same time displaying costly furniture of high polish. The principle can be applied with equally good results for the purpose of concealment, by using mirror tops. For example, if a

certain piece of furniture happens to have an expanse of top out of keeping in color or finish with the rest of the apartment, the objection can be removed by covering it with plate glass in mirror form instead of transparent plate.

Dining-room tables may have tops wholly of mirror glass, or there may be merely a mirror center-piece. The center-piece effect is appropriate on a table with its surface entirely uncovered, or on a table that is covered for protection with a transparent plate glass top.



Vanity Cases

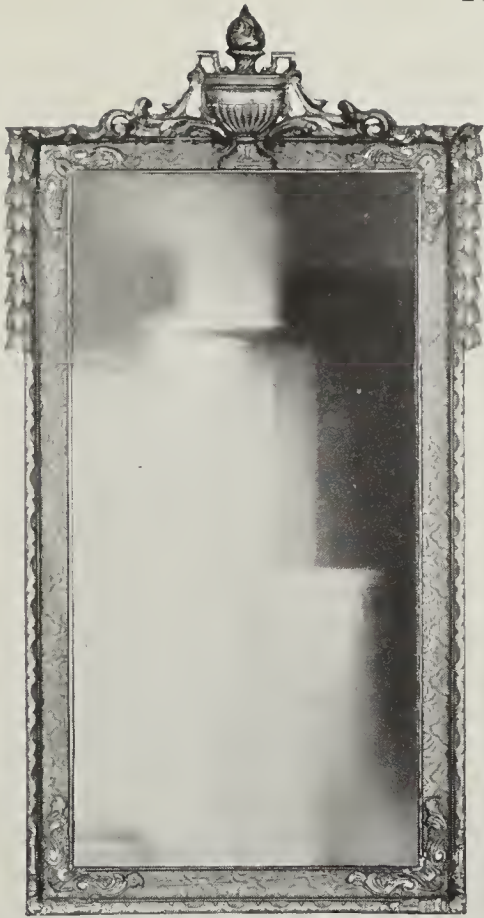
Generous mirror surface is as important in connection with the vanity case as for the dressing table. In this picture a full-length view is easily obtainable and the mirror in itself is a decorative feature of the room.



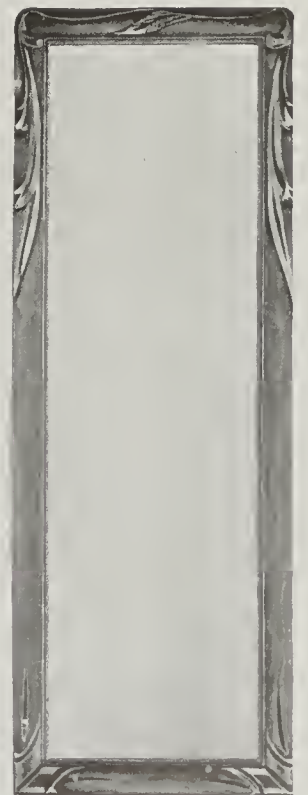
Buffet Mirror

The purpose of a buffet mirror such as is pictured is largely that of architectural ornamentation. In this case it accords perfectly with the Chippendale furniture and other appointments of a handsome room.

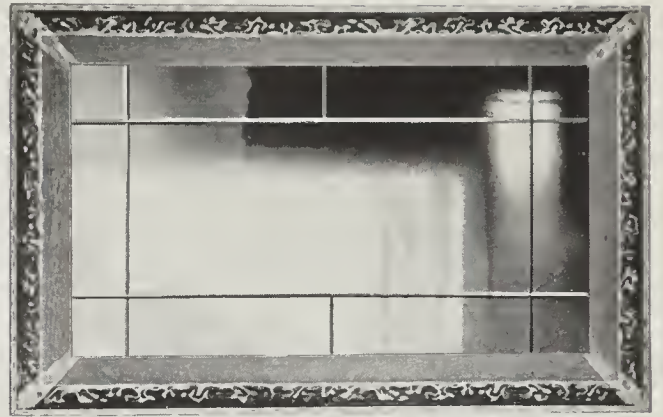
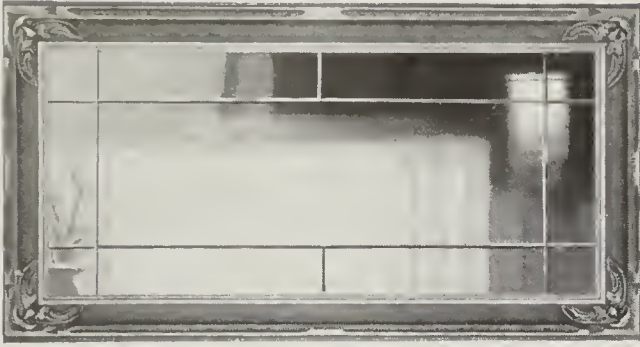
THE MIRROR IN FURNITURE



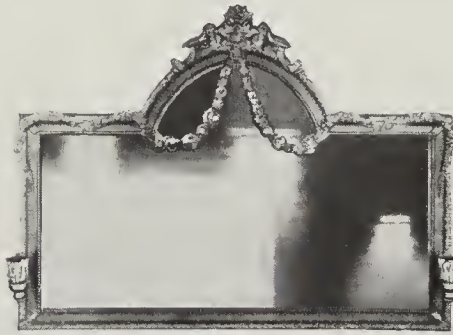
The mirror in modern house decoration serves in many useful ways. By reflecting an exterior or interior scene, a mirror makes a picture in all the exact lights and shades and colors of nature, or it may be used to produce a "spot" of color or a pool of light wherever needed. Many a sombre, uninteresting wall is thus changed to something with character and charm—all by means of a mirror in the right place.



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Here are a few designs in mirrors appropriate for hallways and other places.



THE MIRROR IN FURNITURE



A mirror image can be enhanced by a beautiful frame as personal appearance is improved by handsome clothing.





Wall and Column Mirrors

Plate glass mirrors are coming more and more into use for decoration in the modern public dining room. Diners enjoy the added sense of companionship and interest thus produced.

THE MIRROR IN PUBLIC PLACES

IN HOTELS, restaurants, and other places of refreshment where there are many tables, the mirror has a highly practical value that literally can be counted in the dollars and cents of daily

receipts. Very few people are willing to sit facing blank walls. A feeling of discomfort is common to most human beings when they sit thus turned away from companionship, but a certain



An All-Mirror Room

This is a room of such far-reaching vistas in every direction that the eye finds entertainment in following the oft-repeated reflections.

THE MIRROR IN PUBLIC PLACES



Rear-Counter Mirrors

How uninviting the soda fountain would be without its background of mirrors can well be imagined.

proportion of the seats must be so placed. By the simple expedient of using an unbroken series of mirrors for the walls, all seats are made equally desirable. No matter where a guest is

placed, others are visible. No one is compelled to face a blank wall, and thus every bit of space in the room can be utilized for profit.

In addition, these mirrors give brilliancy



The Modern Barber Shop

Walls and columns are given over to mirrors in the up-to-date "tonorial parlor." The column mirror on the right in this illustration shows miter-cut lines for decorative effect.

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Refrigerator Accessories

In the picture here given the attractiveness of a handsomely appointed butcher shop is largely enhanced by the liberal use of mirrors in the fronts of the refrigerator. The variation of form has been ingeniously employed to make the room more interesting.

both day and night and impart to the scene vivacity and cheer. This probably is the most economical form of decoration for places of such character, where tobacco smoke or incidents of catering soon discolor an ornamental surface. The wall of mirrors retains its beauty perma-

nently and has the advantage over every other sort of decoration, that it always is exquisitely clean. Furthermore, alterations that inevitably destroy other ornament do not lessen the value of such mirrors, since they may be removed intact and reinstalled wherever desired. A value



Column Mirrors

One of the more recent applications of mirror surfaces is to enclose the bases of otherwise unsightly columns. Columns are necessary for support and usually obscure the view, but this disadvantage is practically obviated by making them reflect their surroundings. The use of mirrors for this purpose is extending rapidly.

SPECIAL USES OF MIRRORS

that appeals to interior decorators is that mirrors may be made to serve diametrically opposite purposes. For example, a wall presenting too large an expanse can be so broken by mirrors that it is reduced to dimensions satisfactory to the eye. Or, on the contrary, wall-spaces that seem constrained or pinched are altered so radically in appearance that it is as if some magic had expanded them. This is merely a matter of placing a few or many mirrors according to certain simple rules of optics.

The usefulness of this form of glass for public places is not based by any means upon showiness. It is possible to panel an entire room, and even to give it a ceiling of mirrors, and still keep it in perfect artistic style and quiet elegance. One of the charms of mirror decoration that tempts the modern artist lies in the fact that it lends itself subtly and intimately to the most delicate and unobtrusive beauties of style.

Some of the best effects in such locations as

hotel and theatre lobbies are obtained by mirrors unnoticed by the public, because, though in plain sight, they are so adjusted that neither polished surfaces nor reflections are conspicuous.

The service performed by mirrors in shops is, of course, too well understood to require elaboration. The reader will be surprised, however, if he will devote a half-hour to observing the number of shop mirrors and the variety of service they perform. As with transparent glass, we moderns have become too thoroughly accustomed to mirrors to realize how they fill our daily life. Such places as barber shops, drug and confectionery stores, and beverage shops would be quite inconceivable without them. Thousands of shops and stores would be disfigured with ugly corners, blank walls and columns, or obstructive pillars, were it not for the ever-ready and ever-effective mirror that instantly transforms such incongruous spots into features of real attractiveness.

SPECIAL USES OF MIRRORS

THE mirror, both of plate glass and of cylinder or sheet glass, has long served in a vast variety of ways for industry, from fancy box tops and other minor ornamental purposes to the most important duties, as for locomotive headlights, searchlights, and even telescopes.

The giant searchlights are implements of daily work no less than instruments of war. They serve the miner, the engineer, the contractor, the manufacturer, the farmer. They serve transportation on land and sea, and do it all so well because of their high-grade glass mirror.

Signaling in the daytime by heliograph (which is telegraphing with the sun's rays) is the original wireless. It was used long before the World War and served men efficiently for the works of peace. In new country, heliographing still remains a ready method for communication between parties of explorers, surveyors, engineers, and other advance agents of civilization. It requires no heavy equipment and lays no tax on the slight transportation facilities of parties that have to force their way through wilderness. A few small mirrors will do the work. At any moment men far apart and out of sight and hear-

ing of each other are thus able to communicate. An enumeration of all the industrial, commercial, and scientific uses of mirrors would involve a list of many modern enterprises. It is hardly necessary to refer to the fact that automobile lights, electric pocket flash-lights, and other articles of common use all need mirrors. The automobile driver, speeding along with his attention fixed upon the road before him, has no need to turn his head to see whether he must allow for a swifter car coming up from the rear: he has a telltale mirror at his elbow. The road over which he has just passed unrolls continuously to his view and an extensive image is reflected from the small surface because its concave curve acts as a reducing glass. The interior of the car also, if it be a limousine, is likely to have its mirror in which the occupant on her way to ball or theatre party may take late note of her coiffure.

Bits of looking-glass are very much the rule in the innumerable penny-in-the-slot vending machines. Experience has demonstrated that the mirror will attract possible customers—men as well as women—who then are apt to heed the suggestion of the waiting slot.

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Distortion Mirrors

The old-fashioned mirrors in which defective common glass was silvered must have suggested the humorous possibilities that lay in distortion mirrors. There now exists a regular demand from amusement places for looking-glasses in which the surface has been so skillfully waved and curved as to transform any beholder into a weird monstrosity.



SPECIAL USES OF MIRRORS



Distortion Mirrors

The man with the turtle neck, the man with the zigzag legs, the pair of human step-ladders, and the three-headed wonder, all are here. Such mirrors are always popular and are surrounded by groups of visitors, who seem to find a fascination in seeing to what extent their own familiar features can be caricatured.



The oculist, in making his examination, hangs a circular perforated mirror over one eye and thereby is able to reflect a strong beam of light upon the organ under scrutiny while he peers through the tiny hole in the center. The dentist uses a tiny mirror set at an angle on a slender handle and thus detects the significant discoloration, however hidden it may be. Without this glass his work would be seriously hampered.

The world's entertainment utilizes mirrors extensively. The spot-light, so beloved of actors and audience, is a creature of the mirror. The stage uses it for illusions, for its most gorgeous vari-colored lighting effects, for storm, and for moonlight. The "distortion mirror" in amusement places makes all the world laugh at its own wry image. These weird masterpieces of craftsmanship are made with such scientific knowledge of visual angles that their complexities of surface produce the most startling effects.

A still stranger use of mirrors is that long employed by stage "magicians." Thaumaturgy has

certain mysterious cabinets that when opened to the view of the audience are plainly seen to be empty. People placed in such cabinets are found when the door is re-opened to have disappeared apparently into empty air, but all because of the cunning arrangement of mirrors so disposed as to reflect the top and sides and thus create an illusion of emptiness over a concealed compartment.

Perhaps the most inspiring use of mirrors is that connected with astronomy. Many of the world's greatest telescopes are of the reflector type, which is to say that the observer does not look directly up into the sky but down into a huge mirror of a special type. Upon this are reflected, in a marvelous panorama, planets, suns, comets, and nebulae, and as their rays find their way through the lenses of the instrument they may be studied and even photographed. In this there is a kind of appropriateness, since the moon and planets are themselves mirrors of a sort shining down upon us by means of the light which they, in turn, reflect from the sun.

PLATE GLASS
AND THE AUTOMOBILE



The Joy of Motoring

There would be little pleasure in even so luxurious a car as the one here shown were it not for the constant panorama of changing views that passes in front of the windows. These windows must be of clear plate glass or vision will be strained and the outlook unsightly.

PLATE GLASS AND THE AUTOMOBILE

IN THAT vehicle of the Twentieth Century, the automobile, plate glass is the only practical, desirable, and really economical glass. For the indispensable windshield, for the doors, and for the windows, plate glass is the one satisfactory material, while the plate glass mirror reflects to the driver a perfect view of the road behind, with its possibilities of danger.

Bent plate glass used for windows gives to the lines of the car an elegance all its own, substituting graceful curves for the ugly angles that strike so discordant a note in motor-car design. Altogether aside from the superior strength of plate glass and the security its use entails, its transparency is a compelling argument in its favor as regards a vehicle the use of which is so largely for sight-seeing.

The windshield is one of the modern triumphs of plate glass, exemplifying as it does the intrinsic merits of this material—strength and endurance, transparency and brilliancy—all united for practical service of highest importance. An automobile can be used, to be sure, without this protection, but only at cost of discomfort and of many perils. It is a shield, not only against rain and snow and the wind-blast of swift motion, but against dust and flying fragments of road-metal, which, by momentarily blinding the driver, might cause accident.

Every car-owner today may have a plate glass windshield that is perfect for its purpose. Not even the cheaper makes of automobile can afford to omit this refinement; for the difference in cost between the highest grade of glass and the poorest is an exceedingly small percentage. The initial saving being negligible, and the “economy” so mistaken, no manufacturer would give second thought to the substitution of common glass. In case of repairs, however, the customer is wise who distinctly specifies plate glass.

Window glass, which is made from blown cylinders rolled flat, although inevitably of wavy and uneven surface, is one of the immensely valuable products of human skill. For countless uses it is eminently suitable, but when a material so rightfully possesses its own legitimate field, it is economic folly to try to force it to a service

for which it is not at all intended, and which it cannot render as it should.

Certain inexorable requirements there are which must be met by a windshield. Not only must it be strong enough to remain unaffected by continual and severe jarring and vibration, but it must have in reserve abundant strength to resist at any moment shocks of unusually pronounced violence. Besides being resistant to shock, it must have such uniform strength throughout its extent that it will withstand the heaviest wind-pressure. It must defy the abrasive assaults of dust and flying bits of road-metal, as well as the impact of an occasional missile. It must be not only truly transparent, but perfectly free from all lines of waviness or optical distortion such as must of necessity render the driver's view unreliable.

Such are the requirements; and such, likewise, are the perfections of plate glass, for which no other glass can properly be substituted in this wide application.

Clear vision, entirely free from distortion, can be had only through glass with its surfaces parallel. Grinding and polishing constitute the only method thus far discovered for obtaining perfect surfaces of exact parallelism. While improved methods of making window glass greatly reduce the old-time distortion, this material still is unequal to the exacting requirements of automobile use.

Emergencies are constantly arising where the motorist's margin of safety is only a matter of inches. Instantaneous decision must be based on clear vision. He must steer as he sees. If he sees straight, well and good; but if through the interposition of glass that distorts by refraction he sees objects out of their actual position, accident sooner or later is unavoidable. Polished plate glass in windshield and windows means seeing things exactly where they are. Seeing things exactly where they are spells safety.

Apart from this vital element of safety, common glass does not compare with plate glass in shock-resisting or pressure-resisting strength. The gravity of many a collision has been minimized by the solid strength of plate glass.

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Plate Glass versus Common Glass in Automobiles

No manufacturer would think of using common glass for car windows, but occasionally substitution is made in replacements. These pictures tell their own story. On the right, window glass, or "crystal sheet" as it is sometimes called, means eye-strain and general discomfort to the occupants, while in the other, all images seen through plate glass remain clear and true.

The superior transparency of plate glass in windshield and windows is particularly noticeable in a vehicle moving swiftly because the eye has not the usual time to take note of objects by the wayside. In respect to this fact alone, plate glass amply repays its cost in the added pleasure of the passengers, and this is one of the con-

siderations that move the makers of automobiles to use plate glass and nothing else. Even if the arguments of utility and safety were not so convincing, superior smartness would tip the scale in favor of plate glass. At a time when makers are vying one with another to embody in their newest models every conceivable appointment of



Image Seen through Two Windows

Here is a further illustration of the value of plate glass in automobiles. The left-hand picture shows the columns of a residence as seen, without the slightest distortion, through two lights of plate glass, while in the other picture their outlines are seen distorted by common window glass.

PLATE GLASS AND THE AUTOMOBILE

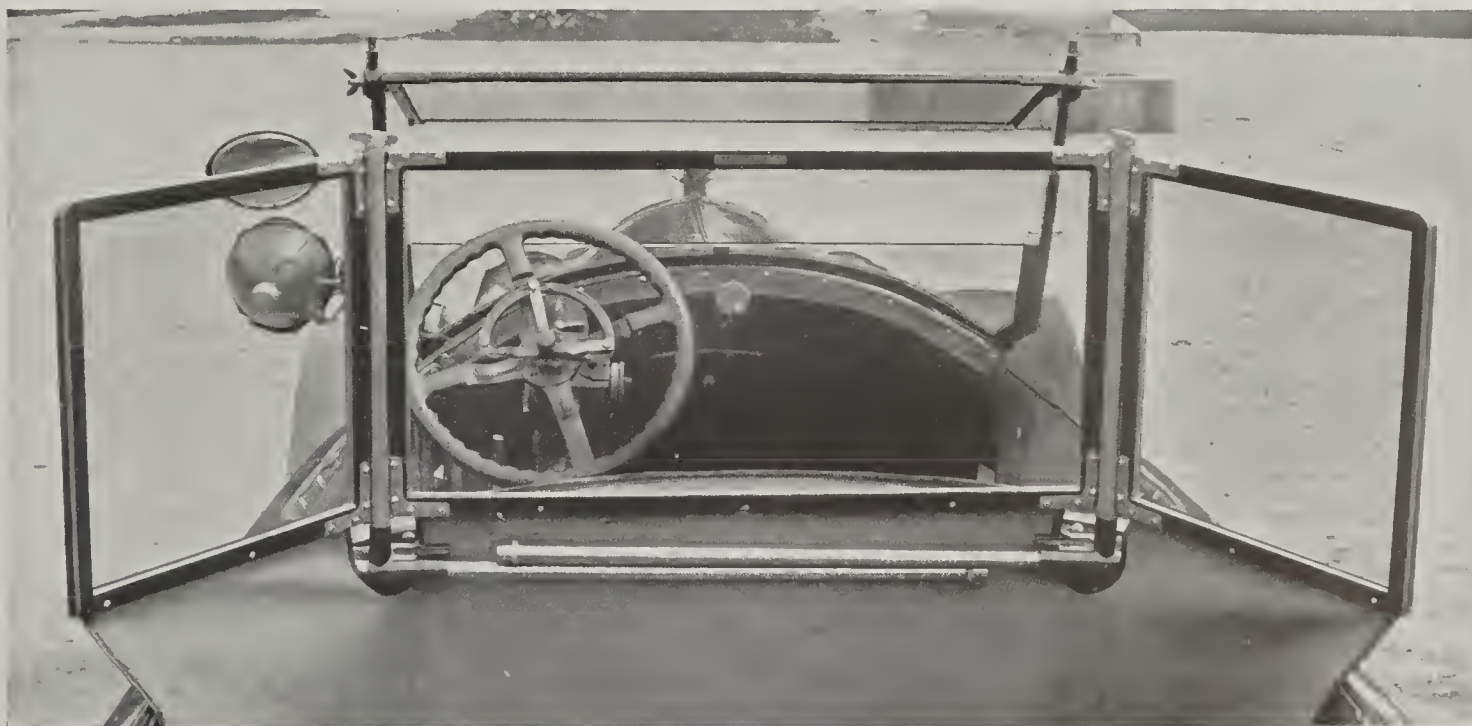


Windshield and Protectors

No automobile driver who values his safety will sit behind a windshield of common glass, for his view of the road must be clear at all times. The wing-form side protectors now in general use are necessarily made of plate glass.

elegance and luxury, it is not to be thought of that any should ignore the irresistible æsthetic appeal inherent in polished plate glass, crystal-

clear and scintillating, to which his majesty the American citizen owes so much of the splendor of his chariot of state.



Tonneau Windshield

Glass windshields protect the occupants of the tonneau from wind and dust without slightest interference with the pleasure of the outlook so long as clear sheets of plate glass are used. The strength of plate glass and its resistance to road shocks and impact of flying pebbles are obvious advantages of the highest importance.

PITTSBURGH PLATE GLASS COMPANY



Automobile Instrument Board

The driver must get quick and accurate judgment of his indicators. This cannot be expected if flawed glass is employed.



Individual Plate Glass Protector

Through his windshield the driver must keep his eye upon the road ahead. Distorted vision is dangerous.

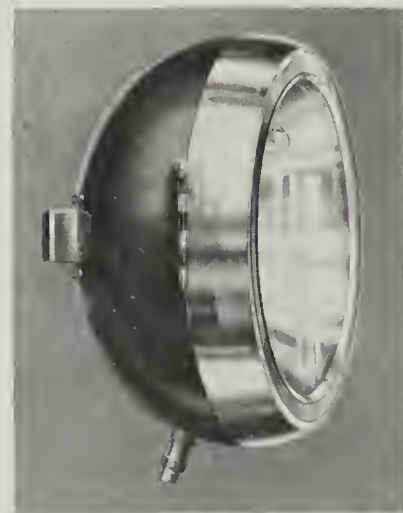
PITTSBURGH SERVICE TO THE AUTOMOBILE MAKER

PERFECTION" is a relative term; progress is the watchword of the present. With a view to the refinement of the plate glass to be used in the automobile, research and experimentation are being carried on constantly in the factories of the Pittsburgh Plate Glass Company. Maintaining a highly efficient corps of service engineers and experts in the handling and setting of all glass, the Company is in position to be of real service to the motor-car manufacturer. Problems of thickness, quality, and size of glass best suited for any given require-

ments should be submitted to the branch of this Company nearest to factory or assembly plant.

Nearly all cities now require that mirrors be so placed that the driver may have a reflected view of traffic behind him. These mirrors never should be makeshift. Their importance merits the use of selected plate, so that distortion of the image will be quite impossible.

Designers of coupé, town car, and limousine bodies will do well to investigate the possibilities of bent glass and the endless opportunities it offers for imparting the last touch of style.



Automobile Bracket Lamp and Spotlight

The maximum of clear and perfect illumination for such purposes can be given only by plate glass.

PLATE GLASS AND FURNITURE

FURNITURE of certain sorts, such as cases and cabinets for porcelain, crystal, silver, curios, and various rare objects of art, would be comparatively useless without glass to protect at the same time that it displays the contents. In such pieces glass is a practically indispensable component. No matter how beautiful the wood may be or how costly its carving and finish, the dominant feature is the transparent front. The quality of glass so used, therefore, deserves the close attention of the maker and the user.

Naturally plate is the only glass that can be considered. Futile indeed would it be to expend artistic effort, labor, and money on rich cabinet-work, only to destroy its quality at the last by glazing with inferior sheet. Such an error would mean to the furniture maker loss of prestige as well as of trade, and to the buyer permanent and altogether needless disappointment.

In modern times glass always has been more or less inseparable from fine furniture. Its use has widened with each generation, and today the furniture manufacturer includes glass among the essential materials. All periods of modern art have so justified the addition of glass in ornamentation of certain pieces of furniture that they would be considered incomplete without it, while in others it is glass that gives the article its utility. In the latter class, bent plate glass, taking the place of side-walls, angles, and front, as in china cabinets, produces an effect of beauty that belongs strictly to the present period.

In very recent years a new and most important field of usefulness has developed, which makes glass not a built-in component of furniture, but a separate accessory; namely, the use of plate glass as a permanent protective covering. While preserving the finish from accidental defacement and extending indefinitely the life and usefulness of the article, this rich plate of polished glass adds a beauty of its own.

Present-day art education in America has taught us the beauty of polished woods. Not so many years ago, the custom was to cover table-tops and dresser-tops with linen or other fabrics wherever possible, but today furniture is

left uncovered: the grain of the natural wood is valued and displayed. The furniture industry has been quick to respond to this change in popular taste, and is producing, even for everyday use, furniture that compares favorably with the choice pieces of earlier art-periods.

The change in style noted has not been without its drawbacks, however. Keeping polished furniture in perfect condition was none too easy in the old days before the problem of domestic help became so serious, and no doubt the former practice of covering dining tables with snowy napery, and library tables, dresser-tops, bookcases, and the like with throws of various sorts had its origin partly, if not wholly, in the desire to keep the polished surfaces unmarred. Even where there is no danger of rough usage, there is dust; and dust has a steadily abrasive effect on lustrous surfaces of this sort.

In this modern emergency appears the polished plate glass top as a defense against injury of every description, a sure shield from dust that nevertheless leaves unconcealed the beauty of the cabinet-maker's art. It is an unobtrusive armor for protection: what the eye can see of the plate glass top is only an added richness of lustre.

The aged effect of many an ancient treasure of cabinet-work is merely the grime of centuries, fixed by successive refinishings. The grain of a once-beautiful wood is buried under layer after layer of dirt and varnish. Plate glass has changed all that. The antiquary of the future will admire Twentieth Century art for itself, rather than for the dinginess of its antiquity.

The plate glass top, aside from its own simple beauty and the service it renders in exhibiting the beauty which it protects, greatly reduces housework. Dusting becomes a most simple operation, for dust, which clings to the most highly polished wood, merely settles on glass, but adheres not at all. Liquid stains that would destroy varnish mean nothing to plate glass, but vanish under a dampened cloth, while the laborious daily rubbing of polished wood becomes altogether a thing of the past.

In using plate glass upon finely finished furniture tops, it is highly desirable to maintain at

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Plate Glass in Private Libraries

Plate glass is an essential part of such an interior as the one here shown. It protects the books from dust without obscuring the beauty of the bindings and preserves the ornamental tables from injury. The fact that plate glass can be cut to conform with the outline of the table top increases the range of its beauty and service.



Plate Glass on the Dining Table

The growing custom of using doilies instead of table-cloth on the dining table makes a plate glass top a necessity whether in a modest home or in an establishment with liveried attendants. Women guests may be trusted to be considerate of a polished top, but men forget. Unhappy is the hostess who sees mahogany threatened with the hot ashes of cigar or cigarette. No such worries mar her pleasure if her table is protected by a polished plate glass top.

all times a slight space between glass and varnished surface. Thin disks of felt or similar material will accomplish this. Under certain conditions glass condenses moisture or "sweats," and the glass top, if laid directly upon the wood, is likely to draw the varnish.

This field for the use of plate glass is only in the first phase of its development. It offers incalculable opportunities to furniture makers and dealers, and to dealers in glass as well; for the plate glass top may be applied not only to furniture in the making, but to choice pieces already installed in household and office.

The furniture maker, in availing himself of this new utility, is confronted by no manufacturing problems whatsoever, because plate glass can be supplied in all desired shapes and sizes. By its aid he is enabled to use many rare woods and to apply delicate finishes which without such protection would be too liable to injury and therefore impracticable.

The furniture dealer, likewise, finds in these plate glass coverings a new accessory merchandise that is readily salable by itself, and helps greatly in the selling of other goods.

PLATE GLASS AND FURNITURE



Ornamental Furniture Pieces

Tabourettes, pedestals, and other purely ornamental pieces of polished furniture have the duty of holding some equally ornamental object—a jardinière, a vase of flowers, porcelains, bronzes, or statuettes. Most of these are heavy and their bases highly abrasive, yet they must be moved daily to prevent the gathering of dust. Varnish cannot survive such friction. Plate glass protects the furniture from injury yet does not hide the beauty of the wood.



Glass-Topped Dressers and Tables

A few years ago the use of glass for such a purpose was unknown. Today it would be a real hardship to return to plain wooden tops.

PITTSBURGH PLATE GLASS COMPANY



The Directors' Table

The directors' room is essentially a room demanding dignified elegance. Infrequently used, it must not look as if it were a scene of daily work and bustle. Its most important furniture is the long and massive table that is inseparable from its purpose. This table must never show a sign of negligence, yet it is sometimes subjected to hard usage. Hard-backed ledgers and account books, letter files and writing pads, ink and cigars do not improve fine cabinet-work. The plate glass top insures the table against injury.



Glass-Partitioned Work Tables

In rooms where desk-workers must be placed close together in order to economize space, glass partitions have particular value, since they do not obstruct the light that falls upon each table and yet permit a semi-privacy for each worker.



Plate Glass Ventilators

Fresh air is requisite for efficiency, but drafts are dangerous. This problem of the open window has been solved by means of the plate glass ventilators which admit air without a draft. Such ventilators are coming into very general use.

THE MODERN STORE FRONT



Then and Now

Fifty years ago when the department store had its humble beginnings, its one show window of fragile common glass must be boarded up at night for safety. Today the great sheets of plate glass not only provide protection for the window contents, but serve as the merchant's most effective selling help.



THE MODERN STORE FRONT

THE use of plate glass for the modern store front is practically universal. No builder or shop-owner would think seriously of suggesting inferior glass for this purpose. As a matter of fact, it would be impossible for a shop with a common-glass front to compete in the same neighborhood with those having fronts of plate glass. Even in secondary business streets and among the very small scattered shops in outlying districts, the superior durability of plate glass induces its use as an economy.

If the modern plate glass store front is not quite so recent as the automobile, it still is very much a matter of our own generation. Persons scarcely past middle age can recall the days when American merchants were proud to advertise the fact that they had installed show windows of "French plate glass."

Older inhabitants also can remember how in the old days merchants everywhere used to put up heavy wooden shutters over the shop fronts at night. One would have to seek far today to find a shop thus barred. Plate glass has become the universal safeguard against burglary at night. In addition to its strength and the noise made by smashing a pane of plate, its transparency, making interiors plainly visible to passers-by and to the police, makes plate glass the most effective burglar-proof device extant.

Adequate display of merchandise is recognized as inseparable from modern salesmanship; but not all merchants apply the principle to best

advantage. It is the successful merchant who willingly expends all the thought and money that bid fair in any way to increase the value of his show windows and show cases. He knows what they are worth to him. The ground area they occupy, he has proved, is the most productive floor space in his establishment, and not in a single square inch of the space so devoted can he afford to fall short of the most effective use of it. The shop front or show window is in fact an auxiliary store, selling without salesmen. It attracts men and women in the street, arouses their interest, sells what is exhibited, and by inviting people inside leads to further sales.

In planning the shop front, its related but distinct purposes should be kept in view. The first duty is to catch the eye of the passer-by and induce him to stop; this may be accomplished either through artistic beauty or by means of some striking feature. Having stopped the prospective buyer, the shop front's second function is so to hold his attention that he will study the display. Therefore the articles in the window must be easy to see; the glass front must be clear as air.

The shop front or show window may be aided in performance of its functions by the exterior show case or "island," so made nowadays as to have no obtrusive framework, being merely a case with walls entirely of glass, put together with neat metal clamps, almost invisible. The contents thus may be viewed from all directions.



A Double-Story Show Front

In this illustration two stories of show windows appear in one story of the store. In other words, the height of the ground floor makes possible an upper and lower series of show windows across the front with adequate room for each.

METAL CONSTRUCTION FOR STORE FRONTS

THE method of using plate glass for store front or show window today is to set it in metal. This gives a shop front practically all of glass. The metal parts are so few and so unobtrusively adjusted as to be almost unseen at a casual glance. The thick bars and sills that marked the old wooden construction have been eliminated. Everywhere glass joins glass and the beautiful atmospheric clearness of the polished plates is unbroken throughout the entire area of display.

Metal store-front construction may be described truly as an industrial triumph. Not only has it done away with unsightly clumsiness, but it gives a rigidity and strength impossible under the old-fashioned plan.

Metal construction, furthermore, brings with it many permanent economics: The metal-set window, once installed, is installed for good and all; it needs no periodical renovation; there is no paint to peel and fade, no woodwork to become scarred and dingy: the saving in upkeep alone will, in brief term, more than cover the whole expense of metal-set construction.

Fire underwriters, of course, always prefer metal to wood. Not infrequently the difference in hazard will effect a very notable reduction in insurance rates. There are several standard

makes and systems of metal store-front construction. Experts of the Pittsburgh Plate Glass Company are prepared at all times to work out the details of any desired installation for architects, contractors, or others. By observing certain simple rules for setting store-front windows a perfect result is assured.

Among the various systems is one distributed by the Pittsburgh Plate Glass Company which is eminently satisfactory and successful. Made by men intimately acquainted with the properties of plate glass, and tested by many years of elaborate trial, it is believed that this system embodies all possible qualities of simplicity, strength, and durability.

Not the least of the recommendations of this system is its beauty. Supplied in solid copper or bronze, and in a large variety of such finishes as statuary bronze, nickel, and gun metal, it is found highly effective in harmony with prevailing architectural styles.

An invaluable feature of all forms of good metal construction is the fact that it makes the show window absolutely dust-proof. The characteristic strength of such a system is achieved by means of an outer construction and an inner reinforcement that draw the outer covering up to the glass plate under tension, thus providing a

METAL CONSTRUCTION FOR STORE FRONTS



Securing Larger Window Area

Because of the arrangement of the glass frontage in these windows it is impossible for a visitor to enter the door without obtaining a distinct, arresting impression of two diverse lines of goods.

bearing that is permanent and unvaryingly uniform. The glass is gripped sufficiently far from its edge to give absolute freedom from any strains or fractures that might possibly be

produced by what is known as "pinching." The plate of glass rests on setting blocks so arranged that at no point can the edge of the glass come into contact with the metal.



A Simple Store-Front Arrangement

The windows here shown are pleasing by reason of their very simplicity, yet give a considerable amount of room in which a few garments may be displayed with an effect of spaciousness. The use of decorative glass in the upper panel adds attractiveness without diverting the eye.

PITTSBURGH PLATE GLASS COMPANY



Windows of Plate Glass and Prism Glass

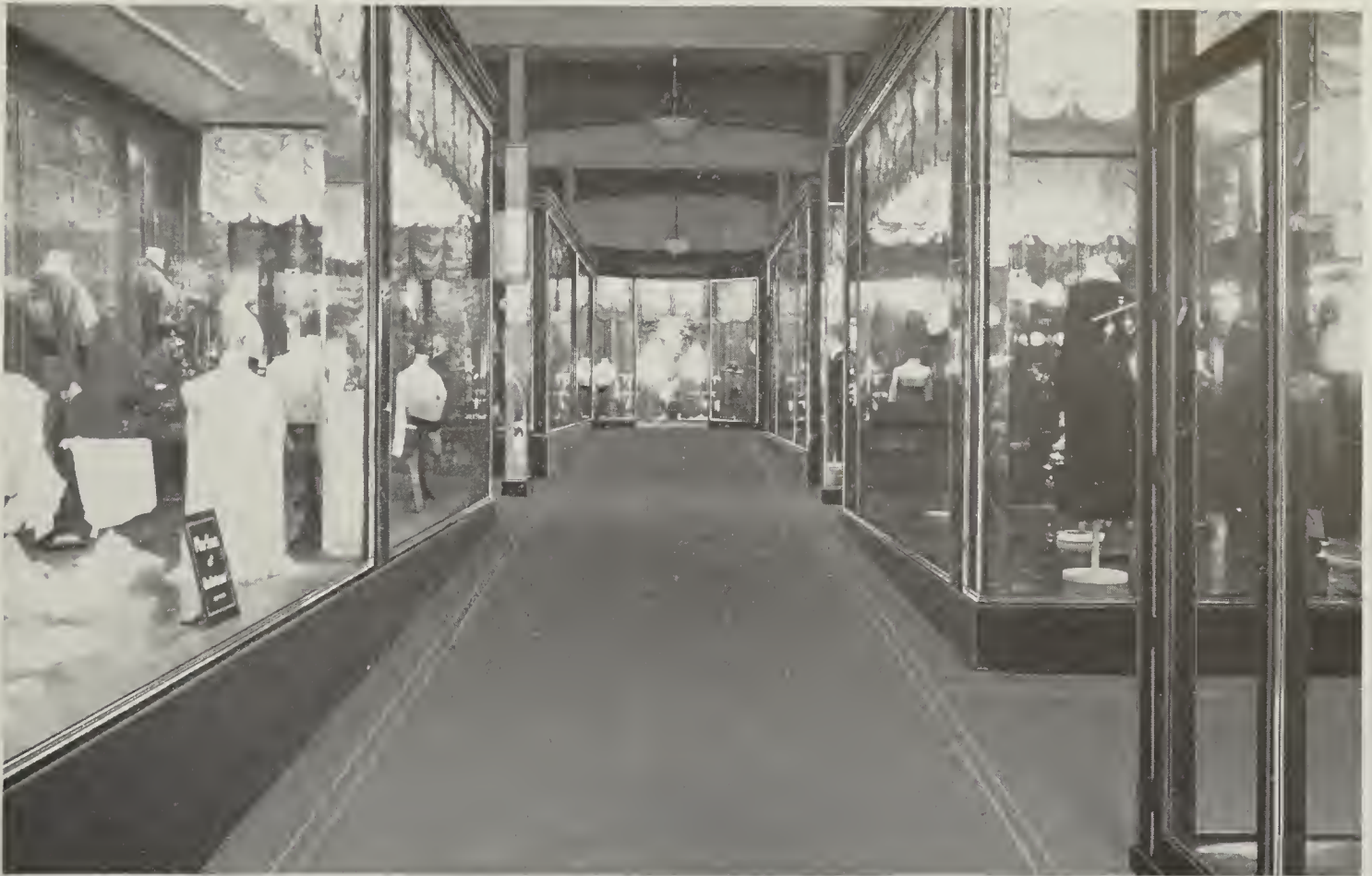
In this arrangement the front of the store is greatly recessed and the windows have almost the effect of detached show cases. By means of the prism glass panels above the show windows, daylight is thrown over the rear cases into the store. This front is a striking example of the chastely decorative possibilities of the prism panel, along with its singular utility as an aid to illumination.



Where the Entrance Door is at One Side

This picture shows an effective arrangement—one show window suitable for large exhibits, supplemented by a side window that adds materially to the comparatively narrow front.

METAL CONSTRUCTION FOR STORE FRONTS



Doubling the Exhibition Space

Almost the effect of an arcade has been obtained in the store where the above picture was made. The visitor approaches the door between plate glass lights set in metal framework and attractively dressed with merchandise. In this case the pillars that occur within the windows are surrounded with panels of mirrors as shown on page 70.



Display Windows for Narrow Store Fronts

These simple but effective windows are in marked contrast and suited to different types of display. In the left-hand picture a considerable amount of space has been borrowed from the shop's interior and turned into window display, thereby making an appeal to the passer-by quite impossible with the old type of store.



Showing the Possibilities of Display in an Arcade

This is window display carried to the n^{th} power, since it presents a succession of plate glass and metal show windows upon the three levels of an arcade. It would be difficult to imagine how a given ground area could yield greater display facilities than are here obtained.

METAL CONSTRUCTION FOR STORE FRONTS



Other Types of Narrow Store Fronts

Here are still other devices for increasing the display area possible for shops of comparatively narrow frontage. The casual visitor who steps in far enough to examine the rearmost cases will find himself close to the door and is likely to enter.



PITTSBURGH PLATE GLASS COMPANY



The Most Profitable Use of Space

In a busy retail district the store area devoted to such a show window as the one here pictured represents a considerable rental cost. Many leading merchants are convinced that space utilized in this manner yields the most satisfactory returns.

METAL CONSTRUCTION FOR STORE FRONTS



Shop Front of Decorative Design

This little frontage has been treated in an unusually artistic manner, including curved panels of plate glass in the door and the use of harmonious curves in the setting for the glass above the entranceway and above the door itself. The windows at either side of the passage gain in effectiveness from this setting, and the marble-and-spindle bulkhead supplies an adequate base.



Ornamentation on a Larger Scale

In this shop front a somewhat similar idea has been worked out much more elaborately and the effect speaks for itself. Plate glass, prism glass, marble bulkheads, and metal settings have been combined with unusual beauty and effectiveness.

PITTSBURGH PLATE GLASS COMPANY



Double Frontage

This is a design of the plainest simplicity, in which no ornamentation is attempted, save that of the valance at the top of the window. Thus attention is directed to the goods alone.



Two-Story Window

In this case the lower windows are available for close inspection while the goods shown above are such as will attract attention from across the street.



Windows with Higher Bulkheads

For the purpose of exhibiting small articles for close examination, a somewhat higher bulkhead than that in the upper picture becomes appropriate.

SUGGESTIONS IN STORE-FRONT DESIGN

THE unobtrusiveness of metal store-front construction, which notwithstanding its great strength requires a comparatively small amount of material, permits the largest possible area of display space. It also permits an unlimited adaptation in size and form to the requirements of display, is remarkably attractive, and of the greatest endurance.

In this section (pages 97–104) are presented many of the adaptations of plate glass show windows that are in use in various parts of the country, but these by no means exhaust the possible effects. The illustrations already given show metal store-front construction as it appears in actual use, while the following pages give in greater structural detail a few of the available designs. For example, on page 98 are shown the possibilities of a front approximating fifty feet in width and on page 104 one of twenty-five feet. In these plate glass and metal are the essential materials used in construction; the bulkhead may be of copper, as shown on page 100, or of stone, marble, or brick, if one of these materials better accords with the style of the building.

Among the essential requirements are the following:

Simplicity of design, both for reasons of beauty and because of its practical economy in the installation and maintenance of the window.

Inner reinforcement as well as outer strength, with the outer covering of joints drawn up to the glass under a slight tension—thus insuring a bearing both uniform and permanent.

Uniform tension against glass, the glass being gripped far enough from its edge to prevent breaking from “pinching.”

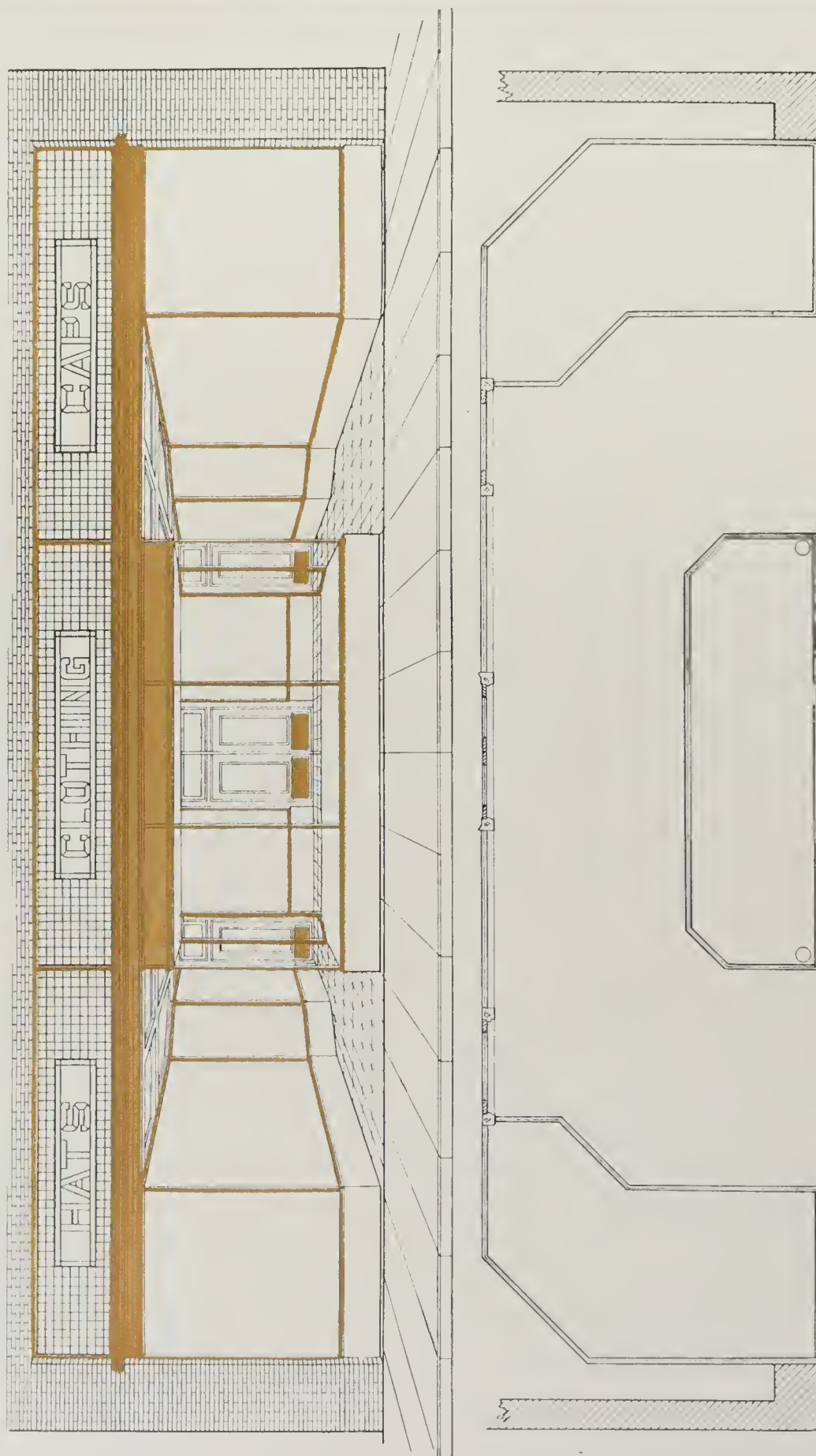
Scientific arrangement and use of the setting block on which the glass is to rest so that its edge shall nowhere come into contact with metal.

Protection of the joints to preclude the entrance of dust.

Ventilation and drainage.

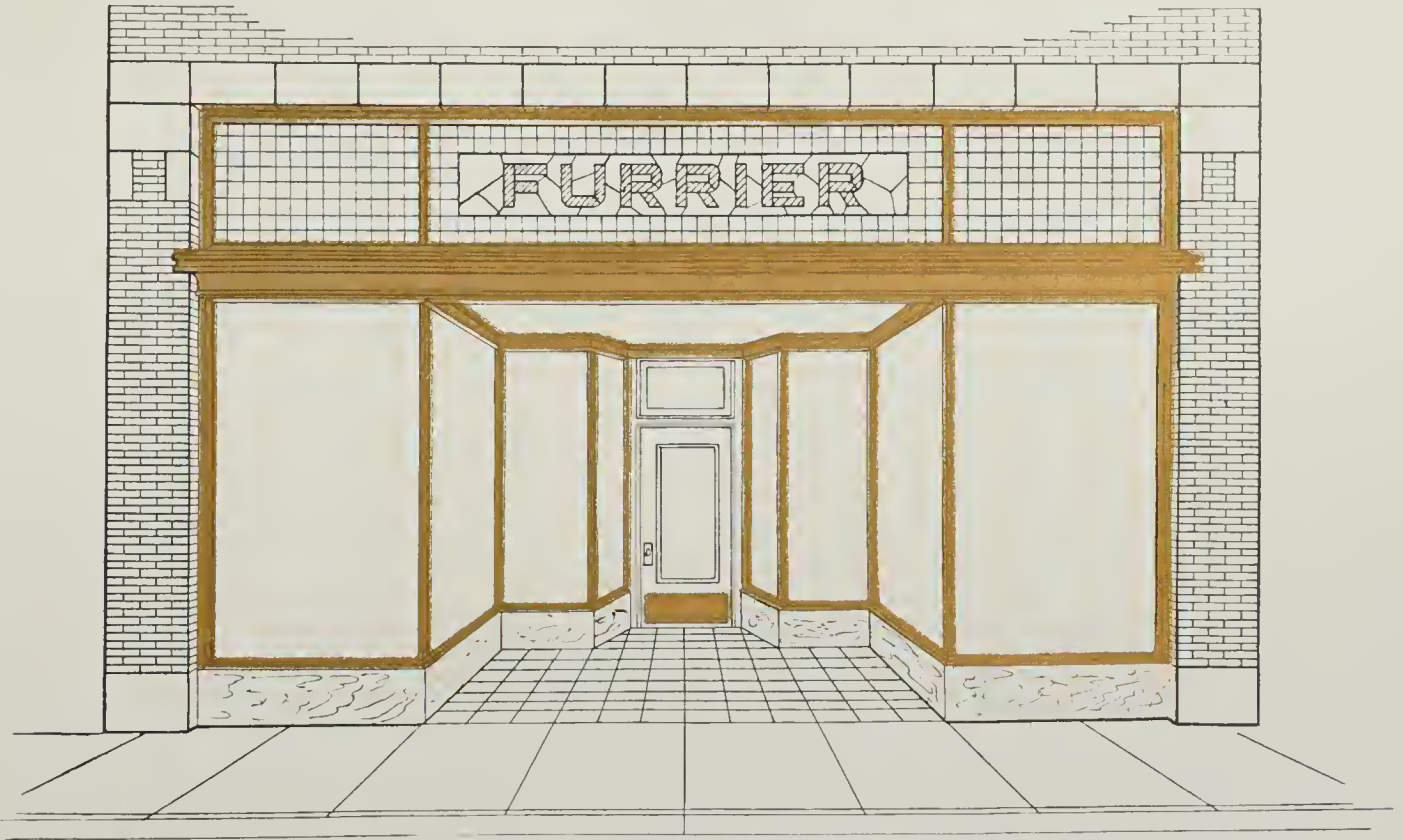
All other characteristics that will enhance the display, preserve its beauty, and insure its safety.

Where an architect is not available, the numerous distributing Warehouses and factories of the Pittsburgh Plate Glass Company may be called upon to give expert advice and assistance. At these points are available thoroughly trained men who have studied carefully all points of importance in metal store-front construction. Thus they are prepared to advise as to the most appropriate design and to give competent instruction and direction in the matter of its execution.



An Attractive Store Front for the Display of Clothing and Furnishings

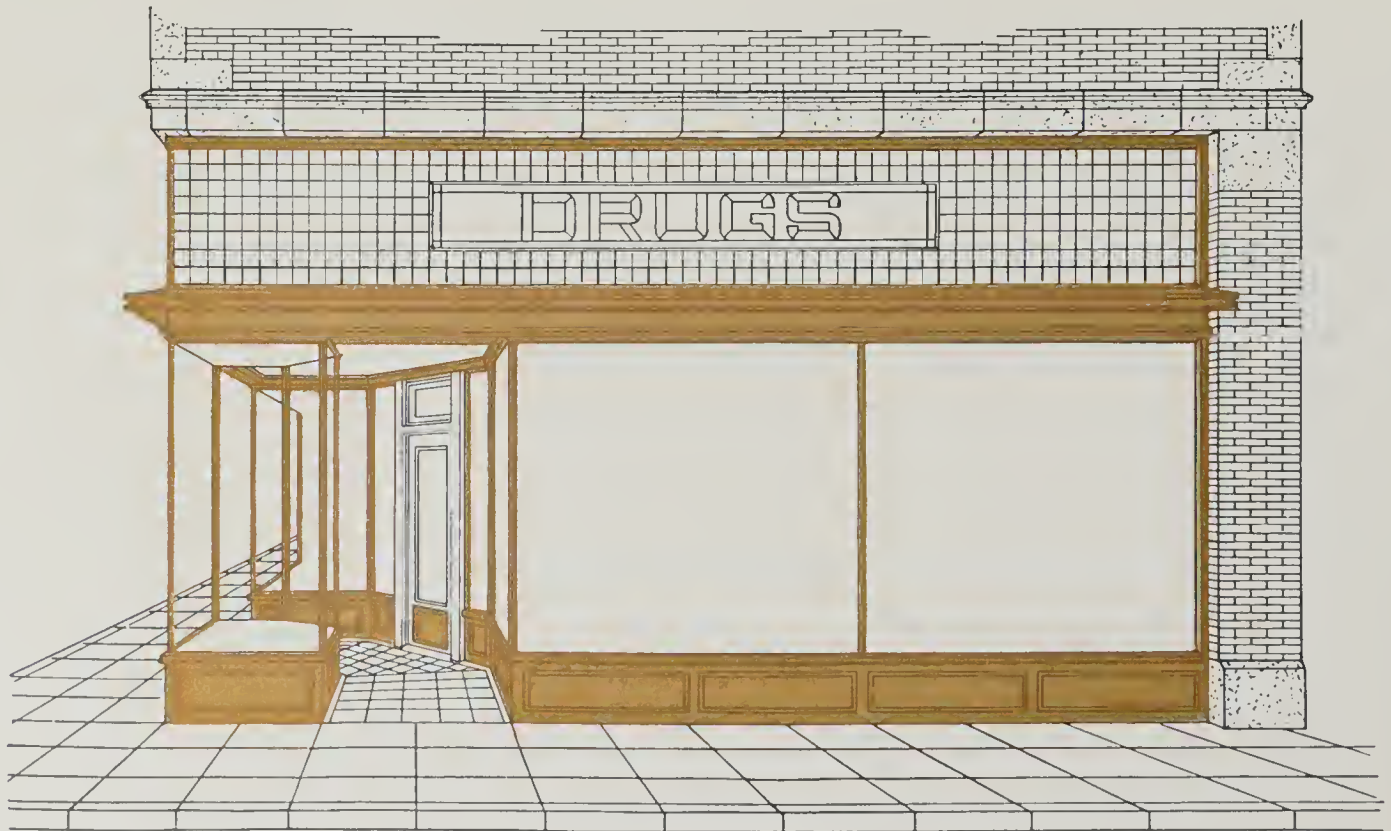
SUGGESTIONS IN STORE-FRONT DESIGN



Metal Store Front with Marble Bulkhead



Metal Store Front with Carrara Glass Bulkhead



Two Attractive Store Fronts Showing Copper Bulkheads

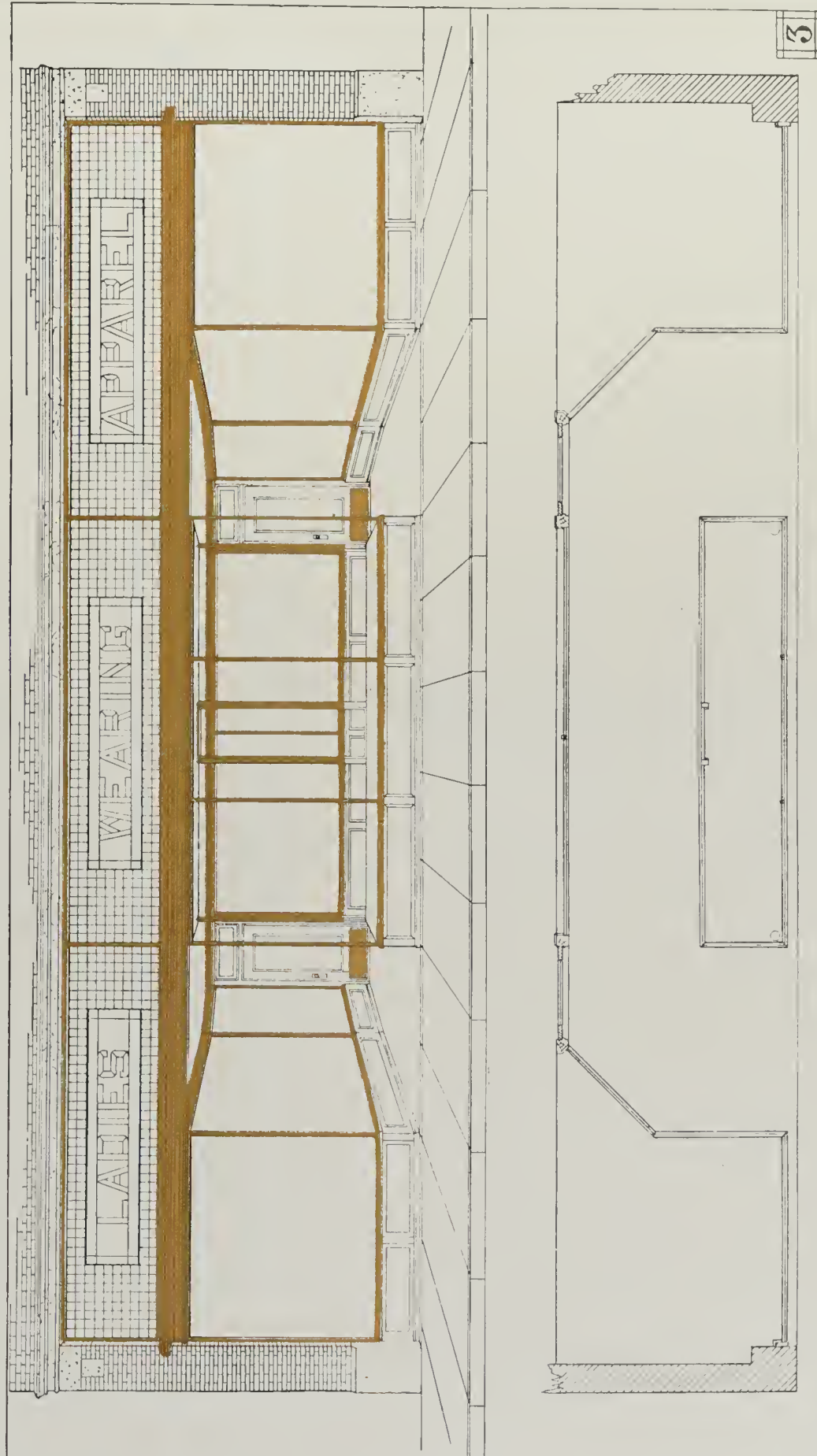
SUGGESTIONS IN STORE-FRONT DESIGN



Upper—Marble Bulkhead. Lower—Built-Brick Bulkhead

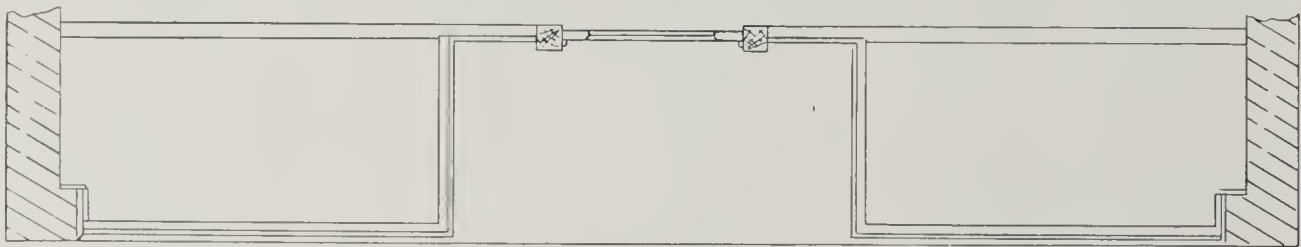


Other Designs Showing Marble Bulkhead



Display Front with Island Show Case

This type of front affords maximum display space with ample room for inspection.



Store Front with Brick Bulkhead



INTERIOR SHOP DISPLAY

THE display in the shop interior continues and reinforces the function of the exterior display in the store front or show window—that of *selling without salesmen*. It should be considered, therefore, always in its relation to the exterior display.

The interior shop display has the additional function of permitting close examination of a considerable number of articles, showing them in a variety of ways to meet all possible personal

preferences on the part of those who are drawn into the store by the window display.

Incidentally the interior display makes customers ask to be shown specific things and thus gives sales-people their chance for personal work. Thus alone can be provided the facilities for close scrutiny which buyers demand; at the same time they are inoffensively prevented from yielding to the general, almost unconscious, habit of handling goods unnecessarily.



No Distortion or Weird Reflections

As this photograph lay on a salesman's desk, a friend picked it up and said, "There is no glass in that show case, is there?" This was an unconscious tribute to the clear, rimless sliding door of plate glass, invisible to the camera and to the eye.



The Customer Makes Selection

Countless drug stores have this type of show case, enabling the customer to select goods without handling and giving sales-people opportunity for personal work. The advantage of rimless plate glass sliding doors is plain.



A Sales Increase of One Hundred Per Cent

A Philadelphia drug store removed its antique show cases of window glass and replaced them with a modern plate glass equipment. This change resulted in increasing the display space from 144 to 428 square feet, and in adding one hundred per cent to the sales in a single year, in spite of general business depression. The new equipment is here pictured and the old is shown below.



The Old Equipment

A few years ago such equipment as this caused a druggist's heart to glow with just pride. Now it merely shows by comparison how rapidly the science of show-case display has progressed.

The customer selects his own goods from the display and sells himself more than a good salesman could persuade him to buy. Without plate glass this display would be impossible.

The plate glass show case gives clear vision of the goods with protection from dust and handling. An equivalent display without a show case would cover the tops of six counters, filling eight times as much floor space. A plate glass show case multiplies sales. Actual experience proves it conclusively.

For example, in the drug store shown on this page, it was found that during the period of the old equipment *not two customers out of ten* made any purchase in addition to that for which they came in. After the modern plate glass show cases were installed, however, it was found that *more than seven customers out of ten* made some purchase in addition to that originally intended. The net result was a fifty per cent increase during the first month, the increase continuing until within a year it had reached almost one hundred

INTERIOR SHOP DISPLAY



Department Store Interior

Delicate merchandise such as that here shown would soon be damaged by dust and handling were it exposed on open counters. Show cases with glass tops and sides preserve its fresh and attractive appearance. Without plate glass and mirrors, the large department store would have a gloomy interior. This picture also illustrates an effective use of bent glass.

per cent, although the period was one of business depression. The store simply increased its *average sale per customer*, and plate glass played a large part in producing the gain.

The new method of using frameless plate glass sliding doors in wall display cases increases the display capacity thirty per cent by doing away with cumbersome and unnecessary wooden frames. Plate glass is the only glass that can safely be made into frameless doors. The edges of the glass are rounded and polished. A finger-hold is ground into the glass. The door slides on ball-bearing rollers and fits into dust-protecting grooves at the ends. The breakage on frameless doors is negligible. One chain-store system using more than five hundred frameless doors reports its breakage as almost nothing.

The ability of a merchant is shown in his use of space: store space in high-rental districts is too costly to be used for the storage of goods that are not "moving." There is no "under the counter" or "up on the shelf" in stores like those



Great Gain in Space Without Increase in Rents

One six-foot unit show case of the type here pictured displays more merchandise in a much more attractive manner than the tops of six counters.

PITTSBURGH PLATE GLASS COMPANY



Jewelry Store Interior Show Cases

General as is the use of plate glass for exterior window display, vastly more is used in show cases inside the store. The clear, transparent plate glass, by reason of its brilliancy and beauty, is particularly appropriate for the display of gems and plate.



End Display Case

The use of plate glass bent to curves multiplies opportunities for displaying goods effectively in restricted spaces which otherwise might not be utilized.

shown on these pages. Every wall is devoted to showing goods and there is space in the center to give customers abundant elbow room as they inspect the displays.

When a store is equipped with plate glass display cases prominence is given to merchandise instead of to elaborate cabinet work.

"How can I increase my sales when I already have all the good customers in my community?" This question is on the tip of most retailers' tongues. The best answer—the way that involves least risk and expense—is to *sell more goods to the same customers*. This can be done by personal salesmanship and by advertising. The effect of both is more than doubled by lining the walls of the store with fine displays of goods now hidden under counters, on storage shelves, or in the depths of old-fashioned, deep show cases with window-glass fronts.

With efficient plate glass display equipment, saving time and saving labor, sales can be increased substantially without the employment of additional sales-people.

INTERIOR SHOP DISPLAY



Column Show Cases

Otherwise unsightly columns may be made an element of beauty by surrounding them with built-up cases having large display surface. The flanking cases here shown have glass tops, sides, and ends, and mirror backs.

The managers of the five-and-ten-cent stores maintain that their profits come from extra sales of articles that the customers did not have in mind when they entered the stores. In other words, their profits are dependent on displays made in plate glass cases. Thus it is seen, curiously enough, that plate glass has had a large share in making possible the erection of the huge Woolworth Building that makes such extensive use of this remarkable material.

At the other extreme of merchandising, the great Wanamaker stores find that visibility is responsible for eighty-seven per cent of their sales. For this reason, all leading merchants use practically no glass except plate.

In all stores there is a gaining or losing limit for each sale: the retailer loses money on customers who buy under a certain amount. If it costs, as it does in one chain-store system, six cents on the average to get a customer into the store, and if there is a gross profit of thirty per cent on the average sale, there will be a net profit of only *six cents* so long as the average sale



Confectionery Refrigerator

Certain goods in a confectioner's shop should be kept chilled, but with this form of refrigerator case, the temperature requirements need not interfere with display.

PITTSBURGH PLATE GLASS COMPANY



Glass-Covered Tables

In places dedicated to the sale of light refreshments, particularly of liquid nature, glass table tops obviously are desirable.

is *forty cents*. But if through selling more goods to the same person the average sale can be increased to *sixty cents*, the net profit will be increased to *twelve cents*, or an increase of one hundred per cent. This is a practical showing of the way in which plate glass show cases may mean to a merchant all the difference between success and failure.



Glass-Top Display Tables

This picture shows a clever development that is particularly applicable to drug stores. It combines the sanitary advantages of the glass-top table for soda and ice cream with the selling functions of a show case. The patron, while seated at the table, has candies or other goods constantly under his eyes.

INTERIOR SHOP DISPLAY



Display Cases for Costly Merchandise

There is something subtly suggestive in the way in which these dainty and valuable articles have been enshrined in individual cases, almost like jewel caskets. This use of glass within glass enhances the effect of value.



Partition Cases

This shallow case forms part of the partition between two rooms. Its contents may be viewed from either side.



Exterior Display

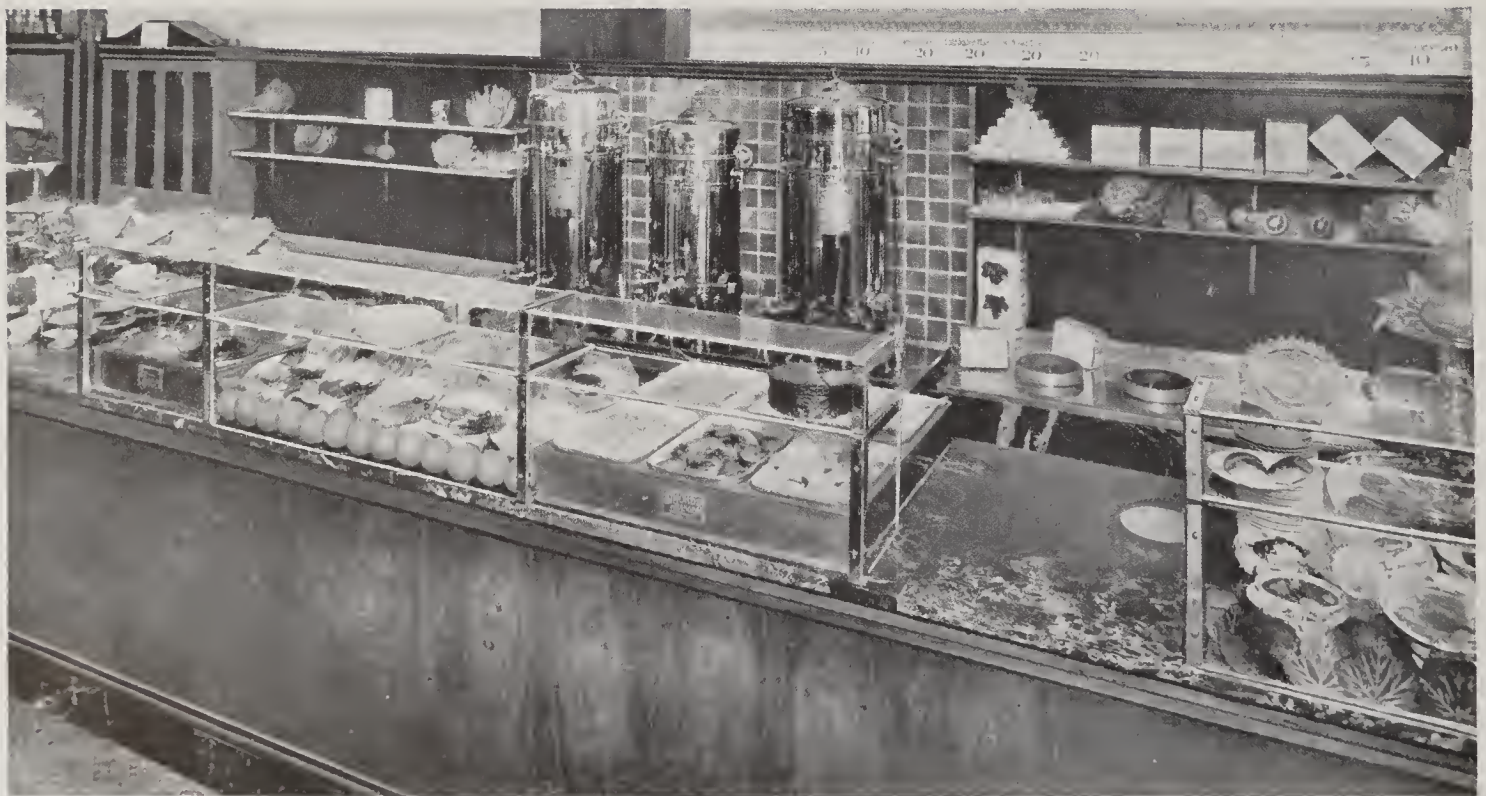
Weatherproof plate glass cases afford ample protection for the contents and increase display space.

PITTSBURGH PLATE GLASS COMPANY



Modern Grocery Display

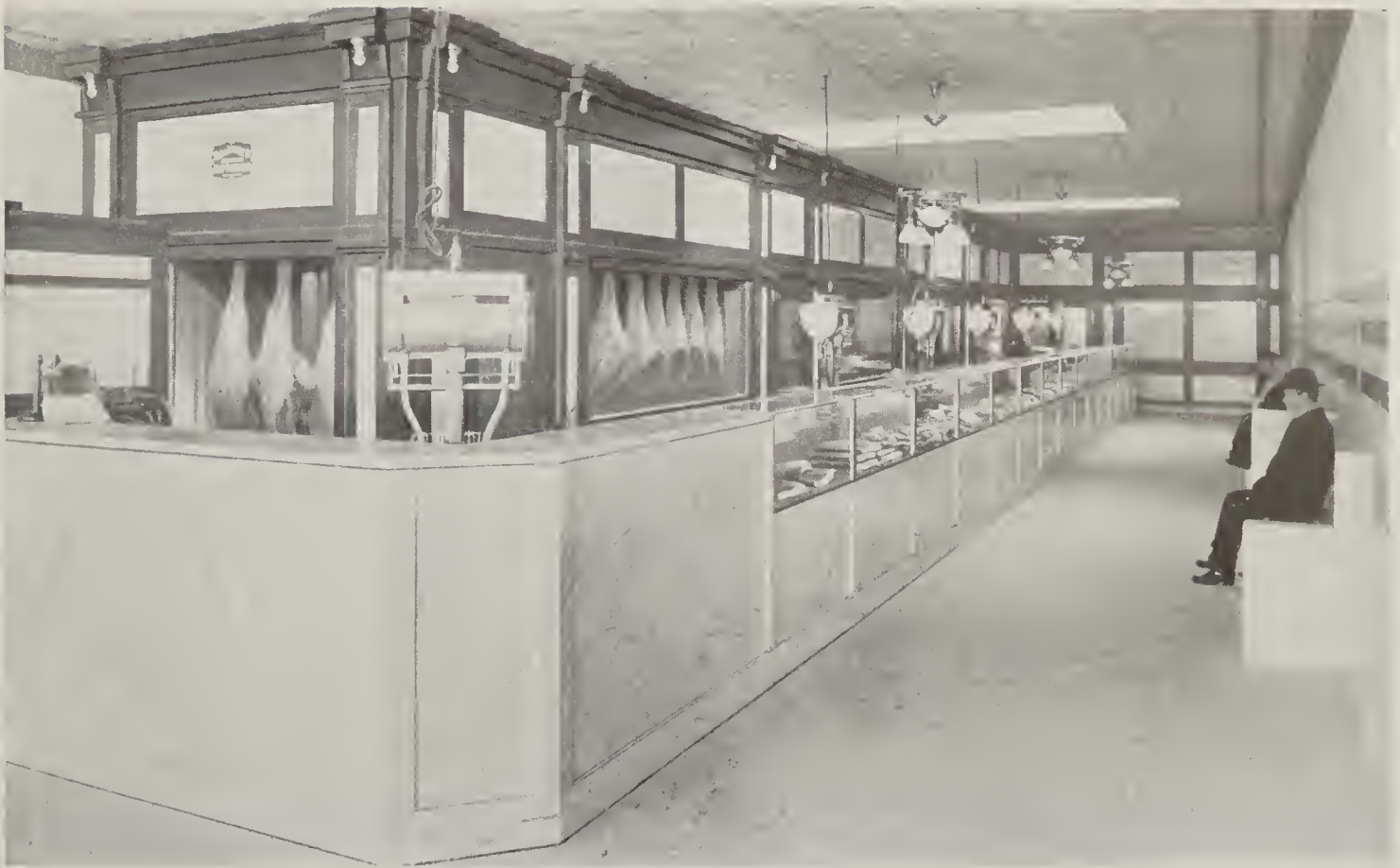
Compare this attractive interior with the groceries of your childhood days. The idea that grocery stores can be made beautiful and sanitary is a comparatively new one, but is spreading rapidly. The partly covered show case on the left makes it possible easily to take goods from the interior while preventing promiscuous handling by purchasers.



Cafeteria Displays

New as is the cafeteria idea, already it has passed through several stages of development. This form, having glass front and glass-top cases with open backs, is the most modern and obviously has come to stay.

INTERIOR SHOP DISPLAY



Butcher's Refrigerators with Glass Fronts

Refrigeration is not allowed to interfere with display. The meats seen in actual cold storage behind the plate glass are for that reason all the more attractive to the eyes of the visitor.



Florist's Display Refrigerator

The roses here shown attract the attention of the passer-by through clear sheets of plate glass, while still preserved from wilting.

PITTSBURGH PLATE GLASS COMPANY



Through Three Thicknesses of Plate Glass

The perfect vision possible through plate glass is strikingly demonstrated in this illustration. The goods in the windows are protected by plate glass front and rear, while the merchandise on the inner shelves may be seen behind a third thickness of plate glass.



Taking Advantage of Small Spaces

Two small plates of glass, their edges fastened with metal clamps, so small as almost to escape notice, make possible a genuine display in incredibly small space.



Plate Glass in Theatre Fronts

All modern playhouses, and particularly moving picture theatres, find many uses for plate glass. In this view we see plate glass in the ticket seller's booth, on the street boards, show signs, and display cases, and in the panels of the entrance door.

MISCELLANEOUS USES OF PLATE GLASS

MEN of the present are so accustomed to glass that they take it for granted. It is such an inseparable and familiar part of their daily lives that they no longer realize how utterly all their modern activities depend on it. Civilized men literally live surrounded by glass. Most of the world's daily work is done by grace of glass. At work or at play, awake or asleep, man is assisted by glass and protected by it.

Yet, astonishing as are the multitudinous uses of glass, to every man who pauses a moment to think, there is a fact that is far more astonishing, namely: that mankind in truth has barely made a beginning of appropriating to his own benefit the usefulness of this material. Though glass has been known since time out of mind, it is only in our own era that it is becoming recognized as one of the chief factors in every in-

dustrial activity. It is perfectly correct to say that the use of glass in the past (and even in the immediate present) is as nothing compared with the vastly larger use that may be expected for this material in the future.

Glass in the past provided us with countless conveniences, beautiful as well as useful, but it remained an accessory material. This was notably true in building; the building was always thought of in terms of stone or wood, and later of iron and steel. Windows were planned in subordination to these materials and to prevailing modes of construction. Today a business building of any kind is planned first and foremost with reference to light. It is window-space that is the leading concern of the investor; and this refers not simply to the openings in the exterior walls, but also to the advantageous arrangement of interior space.

PITTSBURGH PLATE GLASS COMPANY



Office Directory Cases

Both interior and exterior office directories are protected by panes of plate glass; also the photographer's display case.



Plate Glass Door Shields

Sheets of plate glass set in frames are often used to protect an interior from drafts without loss of light or transparency.

Wherever natural light can be had, it involves a permanent economy for the building, for every space that requires artificial light means continual expense. Thus, by an irresistible economic force, glass has become a building material of commanding rank. It has advanced far beyond the point where its use is important merely for windows and skylights. It is considered today as eminently a building material for interior walls, partitions, even for paneling and floors. Its manufacture has kept abreast with the extension of its uses.

In plate glass the growth of recognition has been particularly marked. It is not many decades since plate glass was used nowhere except for mirrors; in fact, its invention was due mainly to the search for mirror glass of better reflecting surface than anything to be found in ordinary sheet or cylinder glass.

For generations after its invention and successful production, the cost of plate glass remained so high that the very name was almost a synonym for extravagance. Even after its use extended beyond mirrors, it remained a luxury.



Hanging Window Signs

There is no more attractive form of window sign than that which is painted or etched upon glass. It is incomparably more elegant than the sign made from metal.



Store Front Signs

The United Cigar Stores Company has studied efficient merchandising in every branch. It is one of many great concerns that have learned the superiority of glass signs.

MISCELLANEOUS USES OF PLATE GLASS



Plate Glass on Shipboard

A ship is built to stand heavy weather and common glass would be worthless in face of wind and waves. Extra heavy plate glass is universally employed for portholes, bridge windows, and other similar purposes. Thus equipped, the ship-builder does not consider his windows as points of structural weakness.

However, so manifest was its wonderful utility, that men never ceased striving to make it available for ordinary use. But their success was very gradual, and it is only in our time that plate glass has become one of the everyday necessities of civilization.

The following pages will suggest additional values of plate glass as it is yearly coming into wider and wider employment in countless diverse applications. In what we may call the "service rooms" of a house, such as bathrooms, kitchen, and pantry, glass doors and shelves save endless trouble. Toilet accessories in the bathroom and

the household medicine supply, kept on glass shelves and behind glass doors, are always sanitary and quickly to be found.

Plate glass has been adopted so generally for every possible bathroom purpose, that artistic unity and attractiveness call for its use in the smaller appliances as well as the large. Among these, delightfully cleanly and agreeable to the eye, are towel rods of glass. They far and away outlast enameled woods and plated metals.

In kitchen and pantry, glass doors, sliding or swinging according to convenience, save the busy housewife much time and many steps in



Portholes



Bridge Windows

PITTSBURGH PLATE GLASS COMPANY



Plate Glass Dining-Car Windows

The tranquillity of a comfortable meal in a dining car would be distinctly disturbed if the views of the landscape were blurred and distorted. A dining car without plate glass windows is almost unthinkable.

search for the countless articles that she needs from hour to hour. There is indeed a basic economy in installing glass in the kitchen, for painted work grows dingy unless frequently renewed. Even glass in oven and refrigerator doors is a refinement rapidly growing in favor.

Practically all theatre owners make extensive use of color reproductions of dramatic scenes for outside displays, where the tempting disclosures of fascinating bits of the play will invite passers-by into the theatre. The ideal covering for these displays is plate glass. It keeps



Telephone Booth

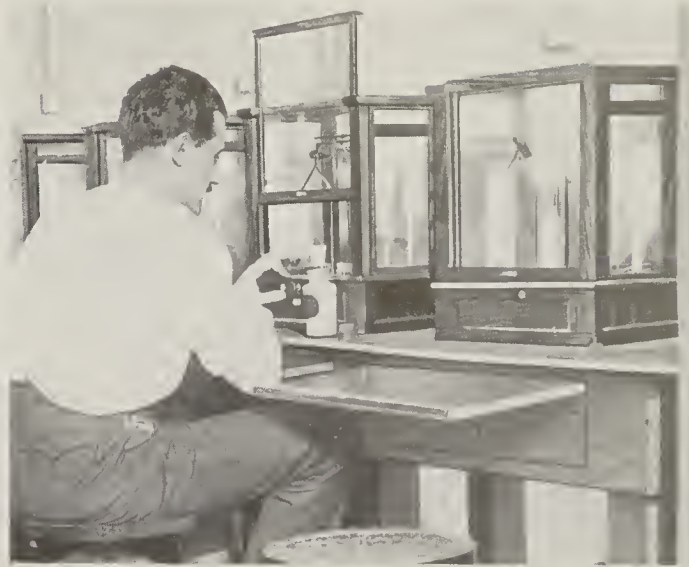
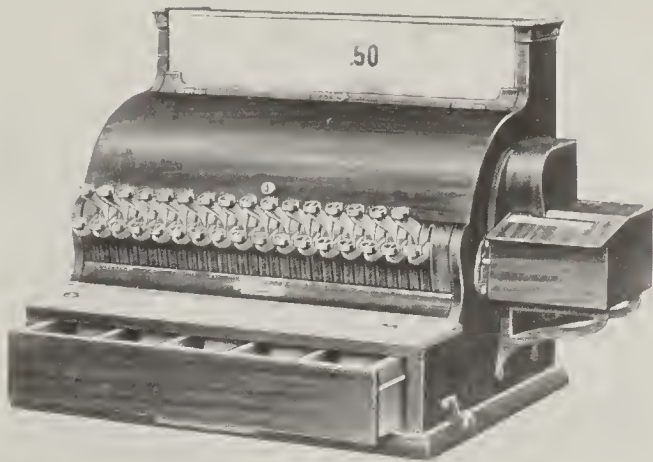
At least one pane of plate glass is required in every telephone booth; sometimes the booth is entirely glass-enclosed.



Exhibition Booth

In such a booth, plate glass is employed in a variety of ways to enhance the attractiveness of the exhibition.

MISCELLANEOUS USES OF PLATE GLASS



Familiar Uses of Plate Glass

Upon this page are shown four familiar uses of plate glass which are suggestive of many others. In all of them the requirements of protection and clear vision are combined.

the advertising material free from dust, protects it from rain and snow, and affords a clear view of the illustrations. For the moving picture theatre, plate glass serves admirably as an effective background against which white letters announcing the title of the movie and the star actors stand out prominently.

The modern operating room may be dreaded

by most of us because of its significance, but there is nothing dreadful about its appearance. The first impression that it gives the beholder is that it is made all of glass. That is not exactly so, but glass certainly predominates, and surgeons would be quite unable to conceive of aseptic conditions for operation except by aid of a material so easily cleansed and kept clean. Glass is the

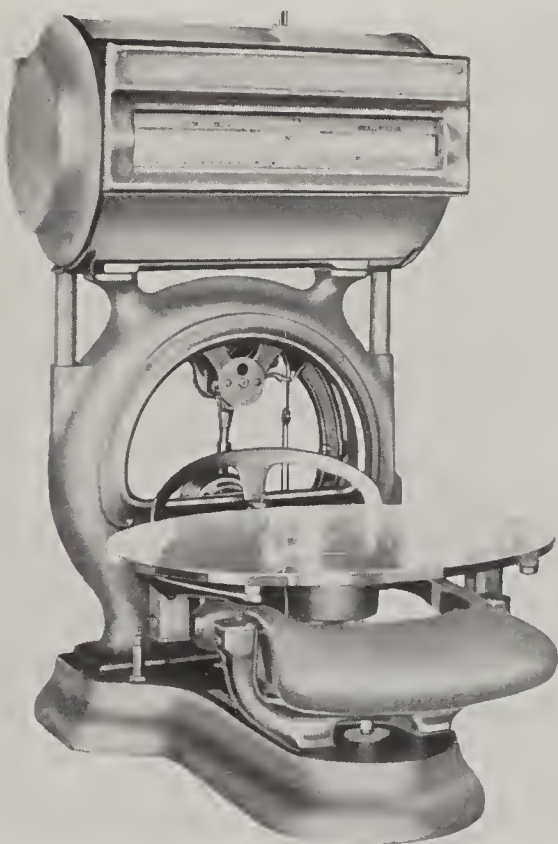




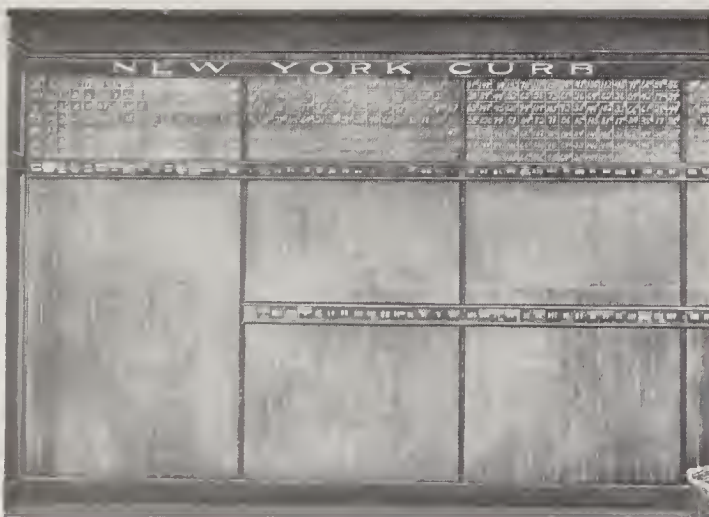
Plate Glass Covers Convert Radiators into Sightly Window Seats

Low radiators in window corners are coming increasingly into vogue. A most attractive way to finish and utilize such an arrangement is by means of an extra heavy plate glass cover-shelf such as that shown in the illustration.

one and only material that meets all their requirements. The powerful antiseptic liquids and washes are for the most part highly corrosive. Metal, even when enameled, nicked, or silvered, is at best only to a degree resistant. Glass is not merely resistant, it is immune. Under the microscope the most highly polished metal surface shows pits and other roughnesses

that are lurking-places for disease germs. Glass, because normally its surface is so smooth, can be made clean not only in the housekeeper's meaning but in the bacteriological sense.

In the commercial and industrial building, the use of glass push-plates for doors has become obligatory wherever attention is paid to appearance and wherever it is recognized that



Making Blackboards out of Glass

Whether employed for stock quotations in brokers' offices, train announcements in railroad stations, or use in schoolrooms, glass for blackboards has proved beyond question its superiority over slate, wood, or other materials.

MISCELLANEOUS USES OF PLATE GLASS



Museum Exhibition Cases

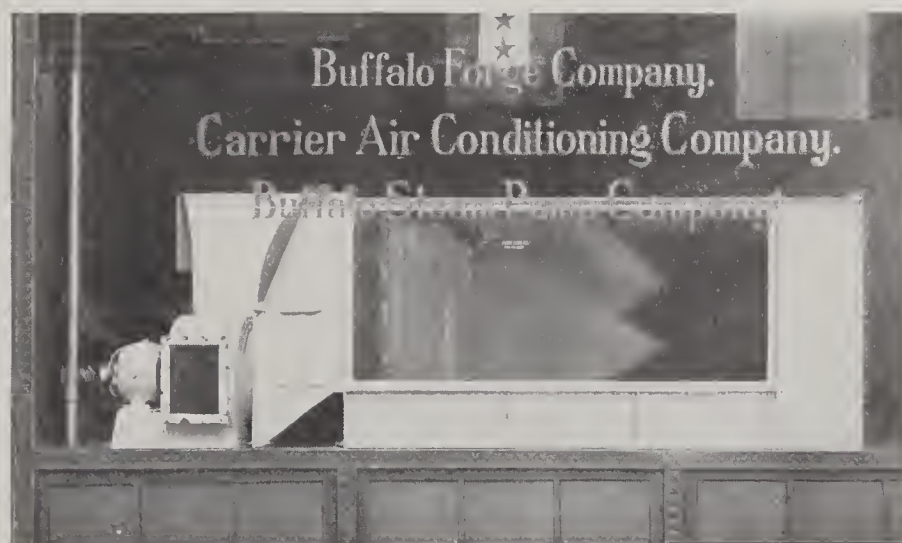
A modern museum without plate glass would be a sorry affair. Exhibits must be protected from dust, excessive moisture, and particularly from handling by visitors. On the other hand, they must be made easy of inspection.

grime is "poor business" and expensive. There are many doors in the home that should not be without this unobtrusive, inexpensive, undamagable, ever-clean little shield. Rear entrance, kitchen, pantry, and nursery doors suggest themselves as obvious places for its use.

There are occasions when glass is to be used in a part of the building where a uniform color

scheme is desired. In such circumstances it is necessary merely to paint the back of the sheets of plate glass to match the other material. The effect of such color showing through the lustrous surface is peculiarly rich and distinguished.

Few indeed there are who realize how steady is the process of abrasion. A case in point is the famous Egyptian obelisk in Central Park, New



Seeing Things in Action

Here is a demonstrating machine and also a popcorn machine: both of them are types of that form of display in which the operation of some process is made visible through plate glass. This is always attractive, because people like to see things doing.



A Diving Tank of Heavy Glass

The submarine lady in the illustration must remain in full sight of the audience while giving her exhibition. An extra-heavy type of plate glass is required for such tanks.



Light in Libraries

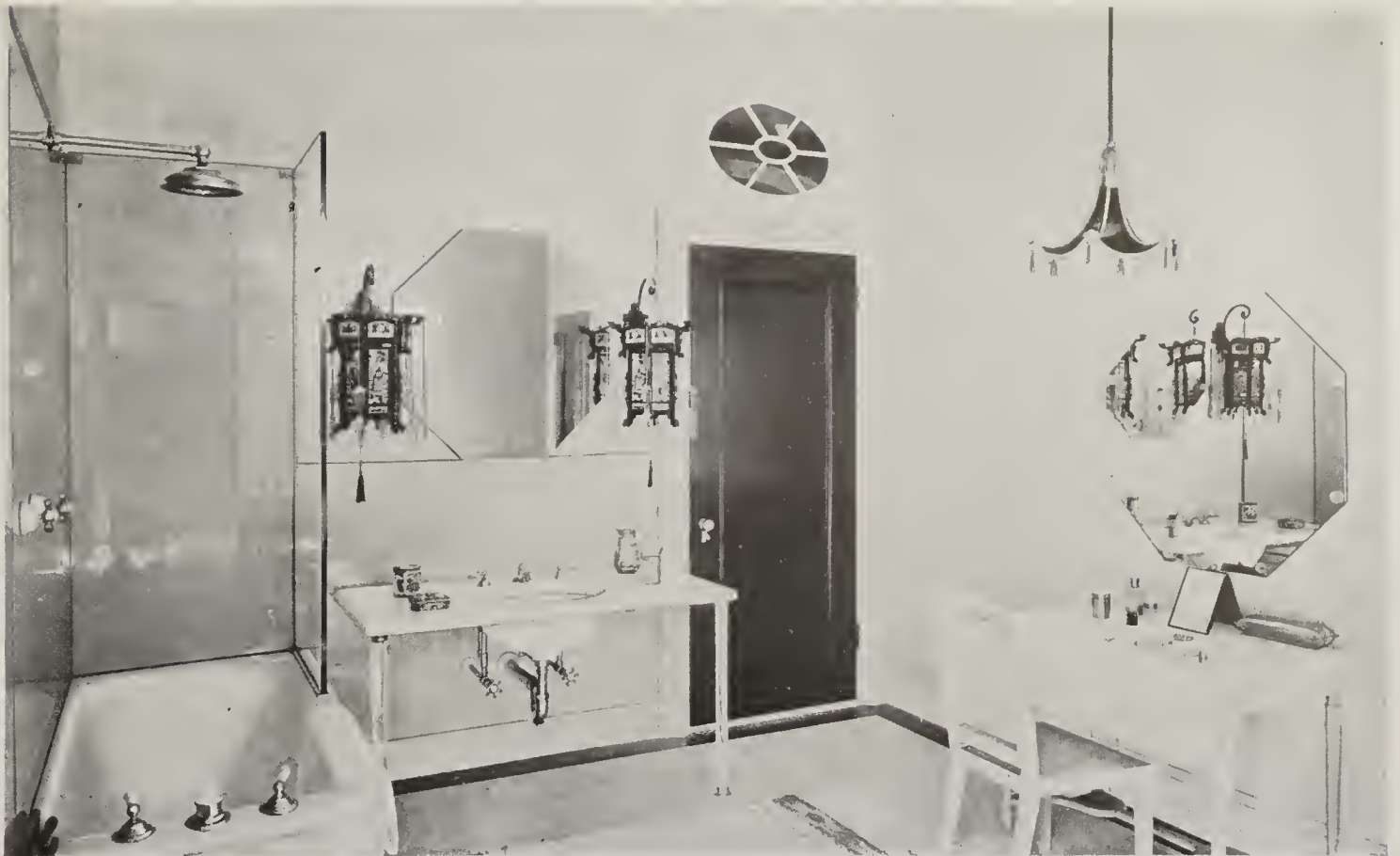
Rough plate glass is now widely used in public libraries for footways and ceilings between the tiers of book shelves, thus taking fullest possible advantage of natural light.

York, which is being so worn away by flying dust and the ordinary effects of "weathering" that students fear its hieroglyphic inscriptions will become quite indecipherable. All the building stones known to mankind, and even structural iron and steel, are prey to the slow but relentlessly destructive processes of nature. Glass is the one material that is practically resistant. It does not oxidize, peel, chip, or weather.

Plate glass for paneling has the advantages of never needing paint or other refinishing, defying scratches and similar injury, and adding impressive richness. The surface behind it may be painted in any color, or the glass itself, stained, opal, black or otherwise ornamental, may give the finish.

In the cold months the great majority of suburban and country houses waste their verandas utterly. This means that in the greater part of our north temperate zone the veranda is in use only about one-half the year. Yet for many purposes and in many circumstances the veranda often is the most desirable spot in the entire habitation, when a simple system of removable sash with plate glass windows has converted it

MISCELLANEOUS USES OF PLATE GLASS



Shower-Bath Protection

Plate glass is rapidly displacing the old-fashioned, insanitary waterproof curtain. Besides being one hundred per cent efficient, the glass protector saves labor and gives striking character to the appearance of the bathroom.

into a bright, warm, spacious sun parlor. Glazing it thus is a notable economy, also, for such an air space insulates the house and cuts down fuel-bills. Sectional sash are so easily made and put

in place that the glass sun parlor may have any form and dimensions. It may take in the whole roomy veranda, or it may be no more than a tiny, cozy, sun-catching den.



Glass Water Tanks for Indoor Decoration

Tanks made of plates of glass in some such forms as here shown and supplied with plants and goldfish make a particularly attractive decorative feature.

PITTSBURGH PLATE GLASS COMPANY



Glass Panes for Lighthouses

Thousands of lives depend on the unfailing transmission of warning signals. Heavy plate glass in lighthouses answers every requirement.

It would be an almost endless task to enumerate all the possible uses for the various types of plate glass, but many of the more obvious applications described or pictured in this



Aeroplane Signals

This is a new use for plate glass. Beams of light must be thrown far and clear in order to guide the courageous bird-men when they fly in the darkness.

volume will serve to show how in the space of less than half a century plate glass has developed from a costly luxury to one of the everyday necessities of civilized life.



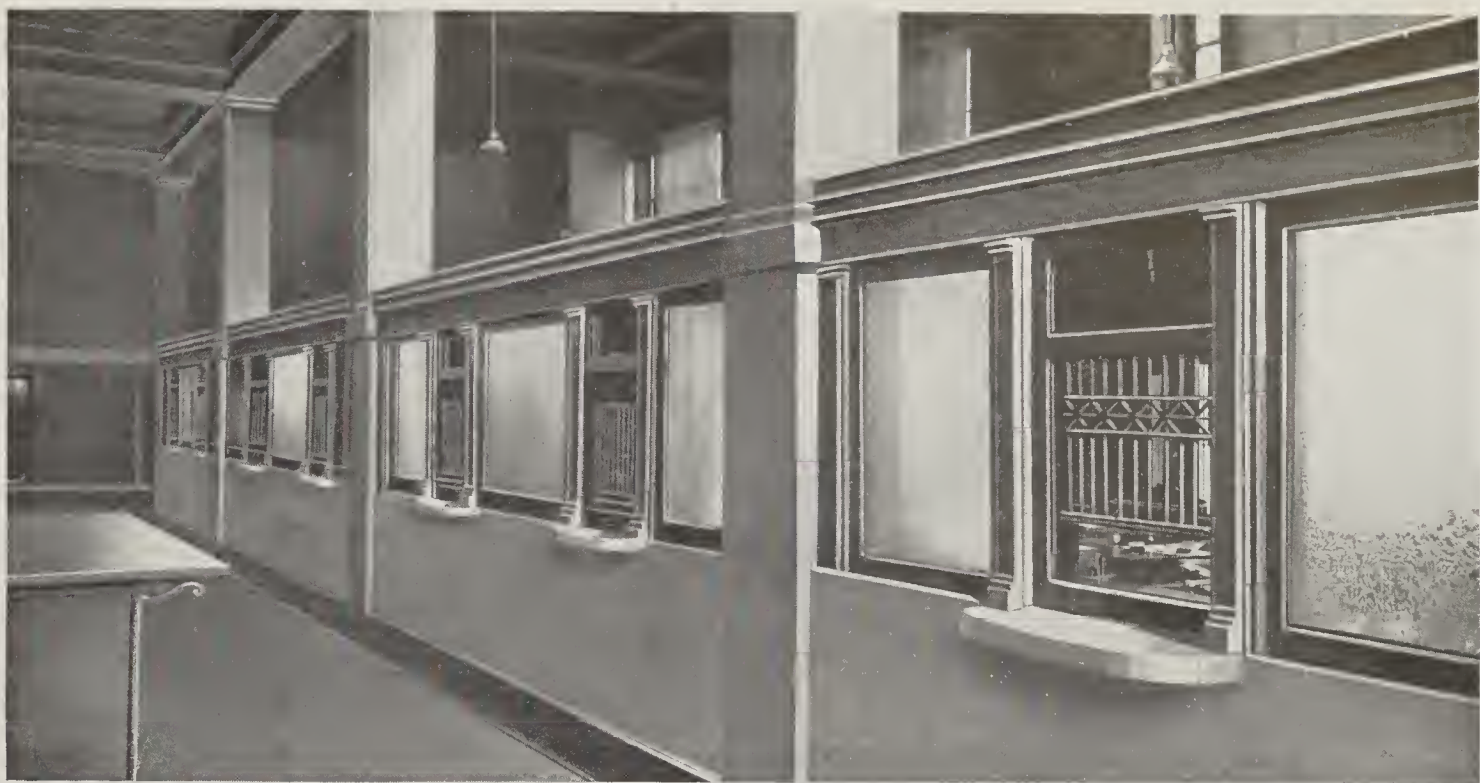
Diver's Helmet

The diver's life depends on his helmet remaining watertight under great pressure, yet he must be able to see his work. Heavy plate glass gives safety with visibility.



An Unusual Table

Anyone would agree that this glass-centered table, with potted plants below the opening, is unique. It suggests views through the glass-bottomed boats at Santa Catalina Island.



Chipped Plate Glass Windows

Frequently it is desirable to obscure vision without obstructing the light. One of the popular means to this end is the employment of that beautiful and varied surface known as "chipped glass."

GLASS WITH PATTERN SURFACES

GRINDING OR SANDBLASTING, CHIPPING, ENAMELING, EMBOSSING, ETCHING

GLASS with patterns of various kinds on its surface is needed for many places where light is desired without permitting vision, as in partitions for private offices, doors leading into private rooms, corridors in buildings, and windows that face other windows, as well as for other uses of a purely ornamental character. The modern glass-maker has at his command a great number of simple processes which enable him to produce, economically and quickly, results that are highly attractive, and which in the earlier days of the industry would have required much labor, besides calling for the most expert craftsmanship.

GRINDING OR SANDBLASTING

By means of compressed air fine sand is driven against a sheet of glass. The process attacks the surface, producing a fine effect obtainable in no other manner, a milky finish that has the appearance of being frosted.

CHIPPING

This process employs the natural stresses and strains of the glass to produce a pattern that is beautifully varied, no two areas being exactly alike in detail. Glass that has been ground or sandblasted is coated with glue, and then subjected to gradual heating. The contraction of the glue as it dries causes it to shrink and shrivel off in flakes, and each flake tears off with it a thin sliver of the glass, leaving a delicate tracery pattern in the clear glass.

No two flakes of glue will peel off exactly alike, and this makes the haphazard pattern entirely different from work done by more laborious mechanical means. The varied forms are what the artist calls "interesting," by which he means that they present a multiplicity of detail on which the eye can rest with unceasing pleasure. There can be no monotony in the delicate designs produced, altogether by chance, in chipped glass.

PITTSBURGH PLATE GLASS COMPANY



Chipped Glass Used Ornamentally

The illustrations give a suggestion of the decorative possibilities of chipped glass in interior use. The door-plates in the picture on the left show an ornamental effect produced by a marginal line of clear glass.

DOUBLE-PROCESS CHIPPING

A sheet that has been chipped, often is subjected to the process a second time. This method removes the sandblast lines entirely and makes a wonderfully rich pattern of intricate detail.

MARGIN, LETTERING, OR DESIGN

If ornamental marginal designs are wanted on chipped plates it is possible to produce clear margins, clear lines, sandblast margins, sandblast or clear border designs, or any desired



Sandblast Line

This illustration and the one on the left above offer a comparison between the clear line and sandblast on chipped glass plates.

GLASS WITH PATTERN SURFACES



Ground Glass Windows

Ground glass is too familiar to need description and is very largely employed where obscure or semi-transparent glazing is desired.

combination of the two effects. When the margin, lettering, or design is to be in clear glass, the required pattern is protected from the sandblast or from the glue coating and its chipping effect. The processes described then affect only the surface that is exposed and when the work is finished the clear glass design stands out handsomely.

An interesting combination of clear and sandblast glass is illustrated in the photograph at the bottom of this page. The lower three-quarters of the plate is made obscure by sandblast to prevent vision into the office from the corridor, while the upper section of the plate remains transparent, with the exception of the ornamental sandblast border lines. This arrangement gives an effect of spaciousness that is not obtained when a solid sandblast light is used.

EMBOSSING AND ETCHING

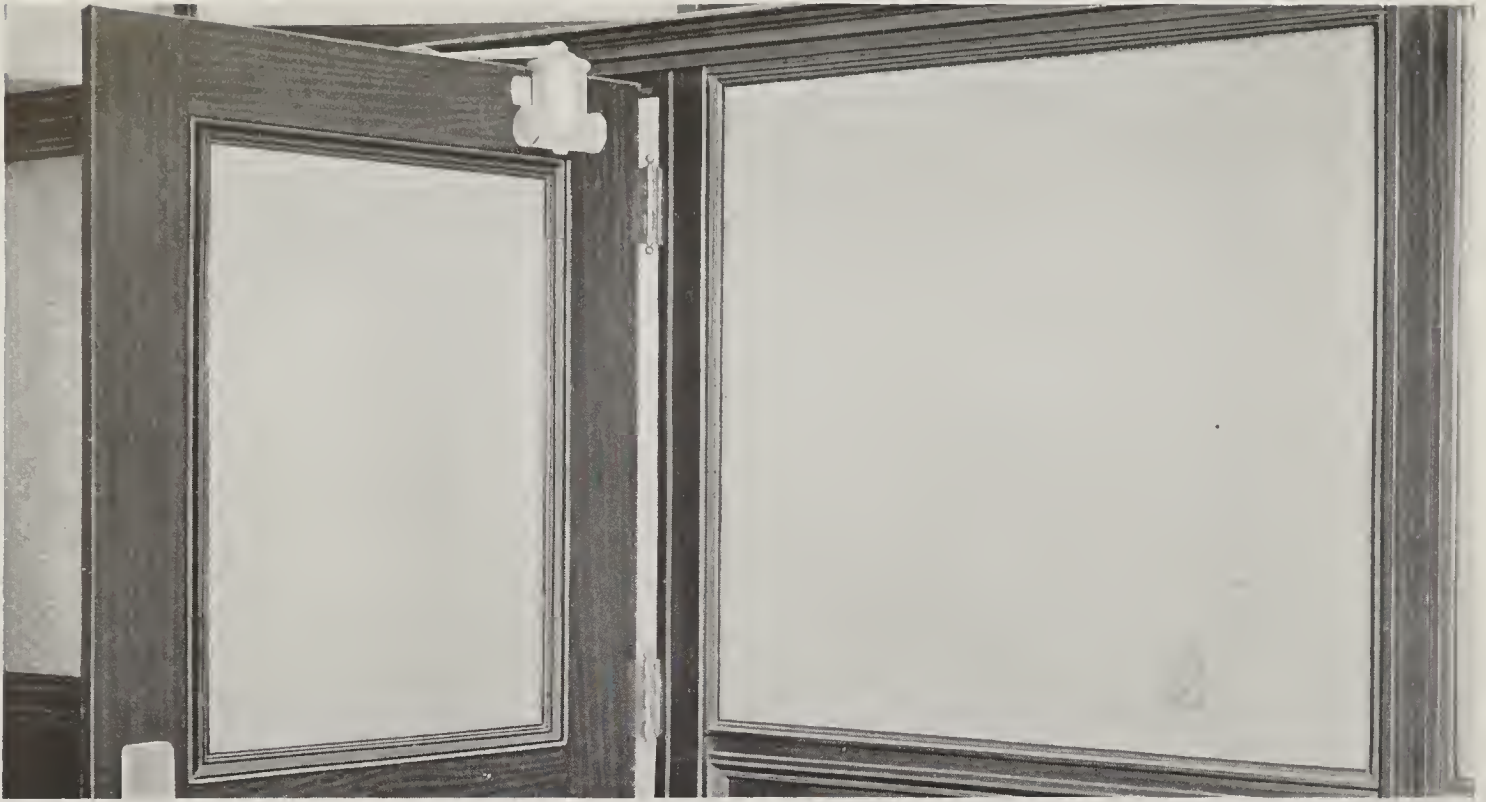
Very often a soft white light is desired without any conspicuous decorations or patterns, and for this requirement there is a glass known as *Embossed Plate* which is translucent without



Combination Plate

In this illustration the lower section is sandblast finish and the upper portion clear.

PITTSBURGH PLATE GLASS COMPANY



Rolled Figured Glass

Various ornamental patterns may be rolled into the surface of the glass during manufacture. These frequently are employed in office doors and partitions, as here pictured.

being transparent, and pleases with its delicate satin-like finish.

Embossed plate glass is produced by treating the surface with an acid, hydrofluoric, which attacks glass. It is permitted to eat into the annealed surface till a subdued, delicate effect, semi-obscure or wholly obscure, is obtained.



For the Photographer's Studio

A combination of ground and clear glass windows enables the artist to secure needed variations in his lighting effects.

ROLLED FIGURED GLASS

This is a cast glass product, the molten glass being poured and rolled into sheets. Instead of being ground and polished, however, it is impressed on one side with a more or less elaborate ornamental pattern. This result is obtained by means of a pattern on the roller or sometimes on the rolling table.

The primary object is to obtain a translucent but not transparent glazing material, to serve in the many cases where light is needed but visibility is not desired.

The figures rolled into the surface give partitions made of rolled figured glass a highly ornamental character, but light-admission with privacy and ornamental appearance are not the only practical values of this material. The patterns are so devised that they are essentially prismatic—that is, they serve as prisms to admit, diffuse, and distribute all the light that can possibly be brought in.

The designs are of a wide variety, some being most fanciful. They range from arabesque to geometric forms, and include also rippled, cob-webbed, straight ribbed, hammered, and many other effects.

GLASS WITH PATTERN SURFACES



Rolled Glass for Factory Installations

The modern factory consists largely of windows; in fact, its walls are little more than huge window frames, since daylight is cheaper and better than artificial light. Varieties of glass largely employed for this use are rolled, rough, and ribbed.

ETCHED GLASS

By the use of dilute hydrofluoric acid the glass is treated superficially without being eaten into deeply enough to make a perceptible depression on the surface. The appearance is similar to sandblast or ground glass of fine texture. The result of this treatment is a snow-white obscure glass. An endless variety of fanciful stencil designs may be obtained by use of patterns that resist the acid.

ENAMELED GLASS

The feature of this glass is a pattern over the whole surface, usually in some geometric figure. It is used exclusively in the ordinary cylinder or window glass.

If the pattern itself is sandblasted, while the background of the glass is left clear, the glass is known as *Clear Enamel*. If the pattern is sandblasted on a glass that has been ground, it is known as *Obscure Enamel*.



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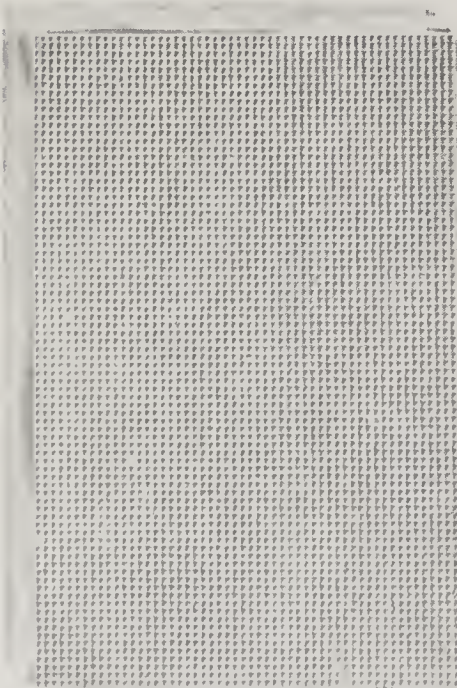
Walls of Windows

In the picture the side of the building is what might be called a wall of daylight, having no mason-work above the ground floor, while the end wall contains but little. This form of installation gives adequate strength and a wonderfully bright interior.

SANDBLAST PATTERNS

As in the enamel glass, there are many patterns of sandblast glass. They are most usually applied to such purposes as transoms, doors, deck-lights on ships, and similar uses. The proc-

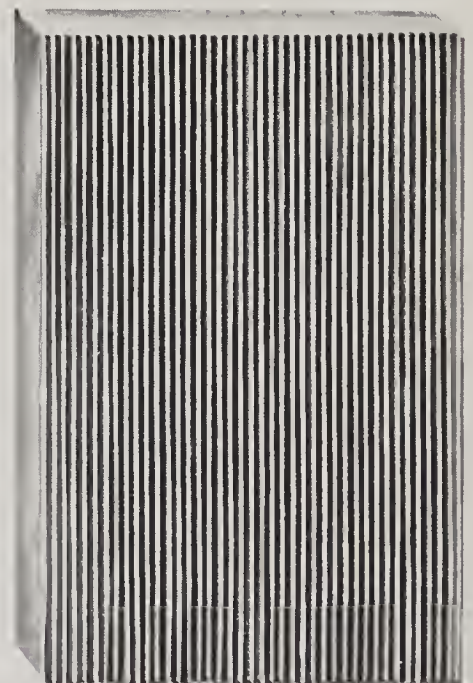
ess is in favor because designs in stencil may be made to suit any purpose or any taste and in great detail, even to the extent of imitating lace designs. Chipped and sandblasted patterns can be made up in infinite variety.



FACTROLITE



PENTECOR



RIBBED

Other Types of Rolled Figured Glass

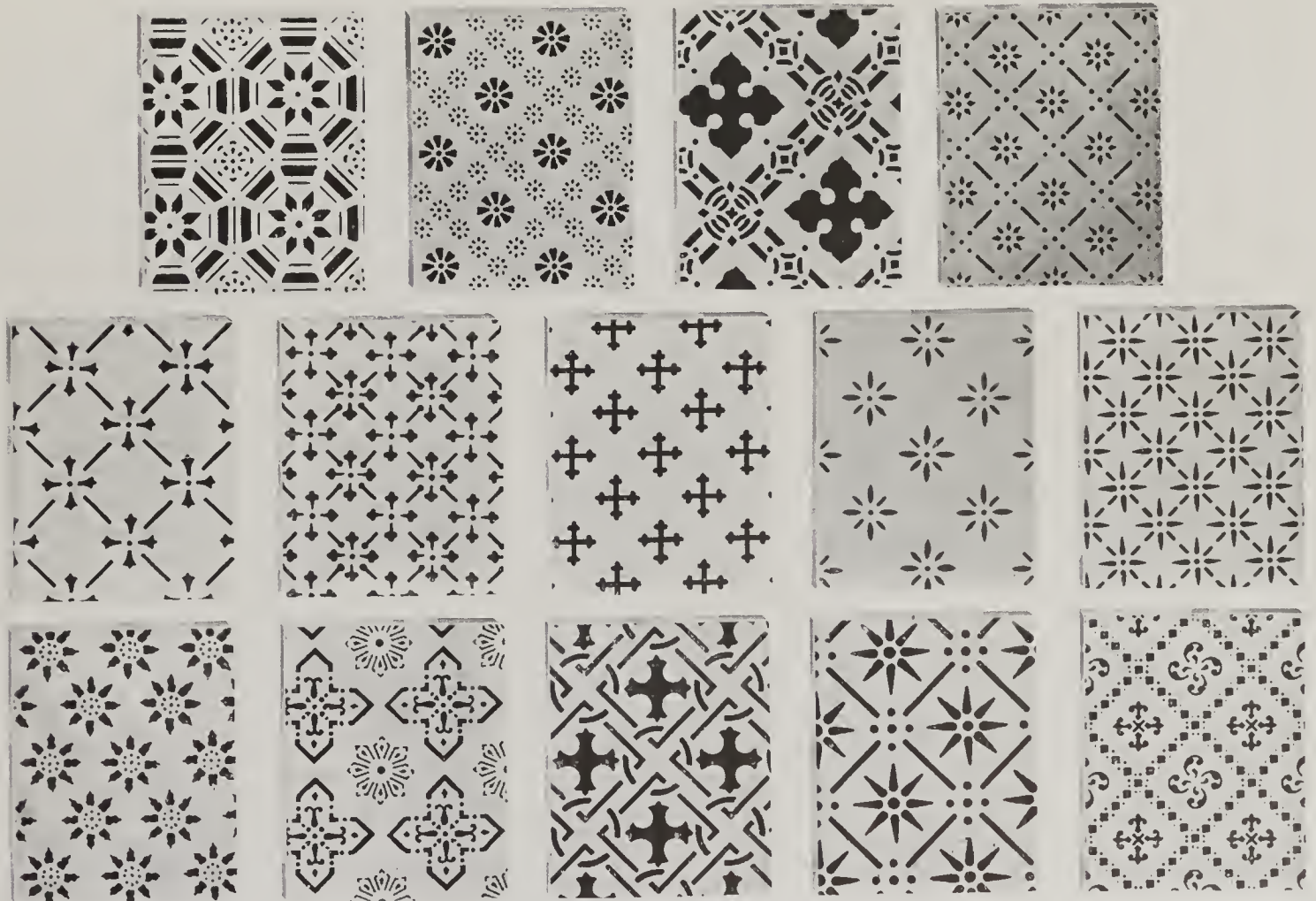
The Factrolite, Pentecor, and Ribbed patterns here shown, being essentially prismatic, serve to diffuse light and brighten illumination, while obscuring vision. This practical utility, coupled with the ornamental character of rolled figured glass sufficiently accounts for its popularity.

GLASS WITH PATTERN SURFACES



Etched Glass Sign

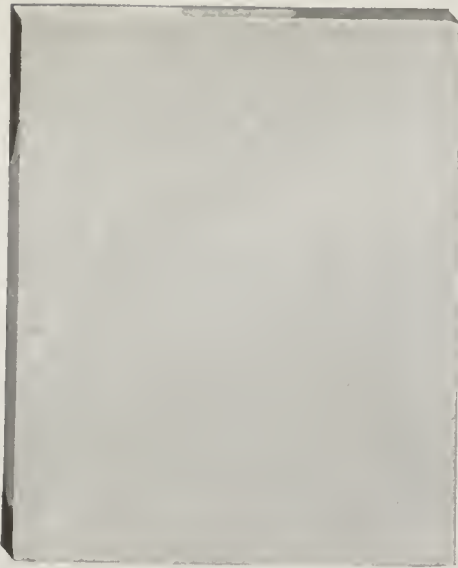
One of the principal applications of etched glass is in sign-work. Signs of this character permit a large degree of ornamentation and may be designed with reference to the arrangement of doors and windows.



Patterns in Etched Glass

All these patterns for etched glass panels can be supplied to suit the taste of the purchaser.

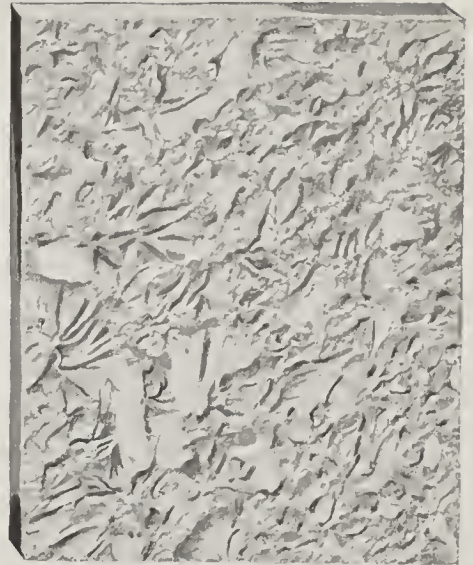
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GROUND

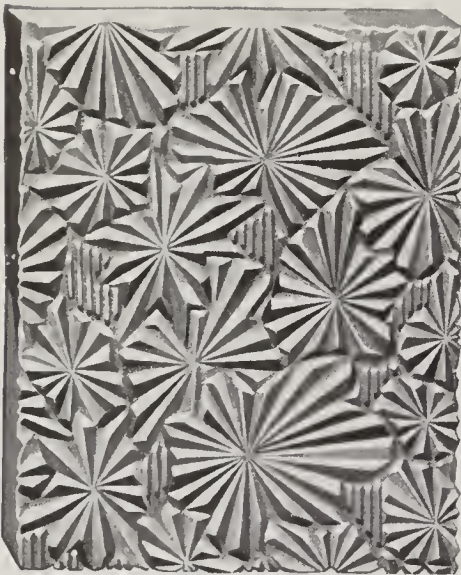


CHIPPED

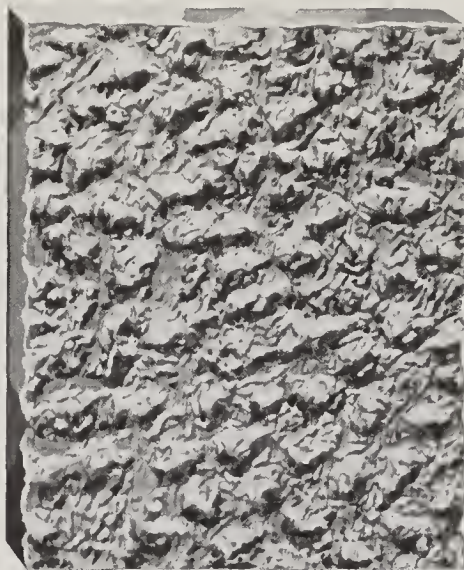


DOUBLE-CHIPPED

Ground, Chipped, and Double-Chipped Surfaces



FLORENTINE



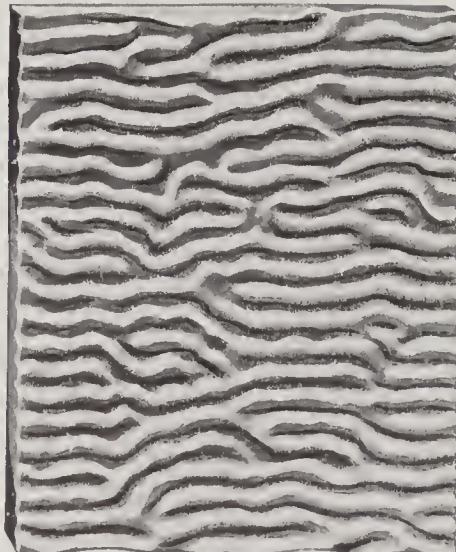
SYENITE



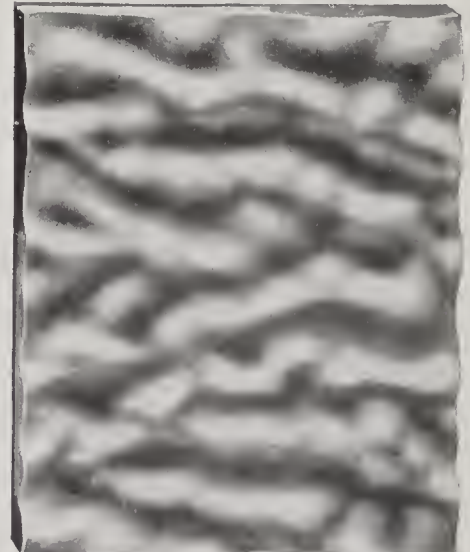
MAZE



ROMANESQUE



ONDOYANT



RIPPLED

Patterns in Rolled Figured Glass



Prism Glass for Store Fronts

The efficacy of sheet prism and prism plate glass as conveyors of light has been demonstrated through their use in thousands of stores and buildings throughout the country. The refractive qualities of the prism ribs serve to direct light to the farthest corners of a room, which would not be the case if clear glass were used.

PRISM GLASS

PRISM GLASS is a commercial high quality glass for exterior and interior windows, with its face patterned in rows of prisms that direct light to places where it is wanted. Thus the same principle of optics that makes possible the modern binocular field glass and range-finder is turned to the broadest practical account in the daylighting of factories, offices, and homes. Exactly how the principle applies is explained on page 137.

Prism glass does not *produce* light, for it can gather and direct only what light there is. But its practical effect is almost the same as if it actually did produce light, since it does increase to an astonishing extent the available light in the interior of buildings.

Thus, in rooms on a deep court or well, or on a narrow street bordered by tall buildings, all the light that strikes the prism sheet is concentrated where desired.

The saving in artificial lighting effected by prism

glass is so well recognized that formulas for all purposes and situations have become highly exact. Knowing the relative height of obstructing buildings and their horizontal distance from a given window, a simple calculation tells exactly the kind of prism required.

All the Pittsburgh Plate Glass Company's Warehouses are in position to give expert advice and to deliver the particular pattern best adapted to any use, on large scale or small. Prism glass is one of the important structural materials of the industrial world, for it renders many an interior, otherwise too dark for any good use, profitably serviceable.



Sheet Prism Glass

PRESSED PRISM TILES

Pressed Prism Tiles are made in squares either four or five inches square. Tile prism work is set in hard metal, all lights being reinforced with steel bars to make them solid and rigid. Geometric designs made from sheet prism glass set

PITTSBURGH PLATE GLASS COMPANY



Pressed Prism Tiles for Store Fronts

Beauty and utility are attained through the use of prism tiles in store-front construction. The tiles are set in hard metal, either zinc finish or copper-plated, with ornamental tiles to enrich the decorative effect if desired and sufficiently reinforced with steel bars to make them solid and rigid. Pivot ventilators can be inserted in the prism tile construction. These ventilators (as shown in the illustration below) are mounted in steel standards, and may be equipped with screens for protection when open. Two examples of ornamental border tiles also are shown below.

in metal, plain or copper-plated, may be obtained and used with very artistic and satisfactory results. Prism glass may be set also in solid copper bars if desired. Pivot ventilators are mounted in steel standards and may be equipped with screens. Fancy border tiles used with this form of glazing make it highly decorative, in a style dignified and quiet and one that presents a distinctly artistic appearance.

PRISM GLASS FOR SIDEWALK LIGHTS

Sidewalk Slabs, which carry glass set in reinforced concrete panels, are the established means

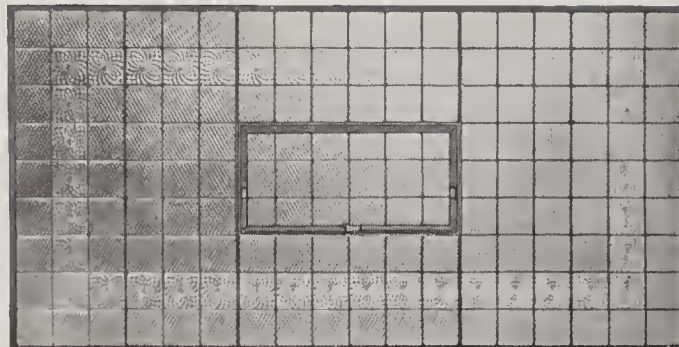
for lighting vaults, cellars, and dark basements in cities. The glass is either square or circular, and is imbedded in concrete reinforced with steel bars. The construction has been improved by long years of study of what has best endured traffic in the busiest places in the world. The panels can be made to any desired dimensions.

GLASS LENSES

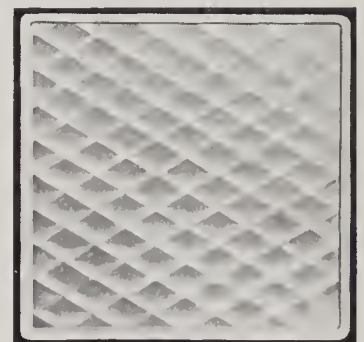
To meet various conditions, *Sidewalk Glass Lenses* are made in a number of different forms which have been found best suited to their particular purposes. They may be had in flat



Border Tile



Prism Tile Construction



Border Tile

PRISM GLASS



Sidewalk Vault Lights

Sidewalk slabs with glass in reinforced concrete panels are widely used for the lighting of dark basements and make it possible to utilize valuable space under sidewalks. Various forms of glass lenses are used for different conditions, either flat pressed units, or drop lenses of a single prism, or multiple-prism lenses, according to the effect desired.

pressed units, or in drop lenses, and these types again are supplied either in single prism or in multiple prism.

INSTALLATION

A detailed drawing or a blueprint must show accurately the sizes of openings. The order should be accompanied also by a good description of the space that is to be illuminated, so that the factory experts may select the best prism lenses for the work.

The slab is made up complete, glazed and finished in any desired size to fit the opening.

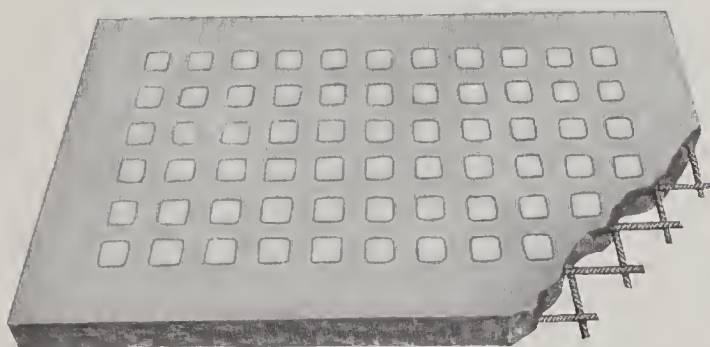


Lighting the Basement

Where more than one slab is required the necessary T bars are cut to proper length and shipped with the slabs.

These slabs can be installed by any workman who will but follow the directions that accompany shipment. The slabs as they come from the factory will be found of perfect fit, ready for the calking of the joints.

In ordering, sizes of openings must be given either by detailed drawings or by blueprint, and the conditions of the space to be daylighted should be described fully in order to secure the proper prism lenses for the best results.



Sidewalk Glass Slab

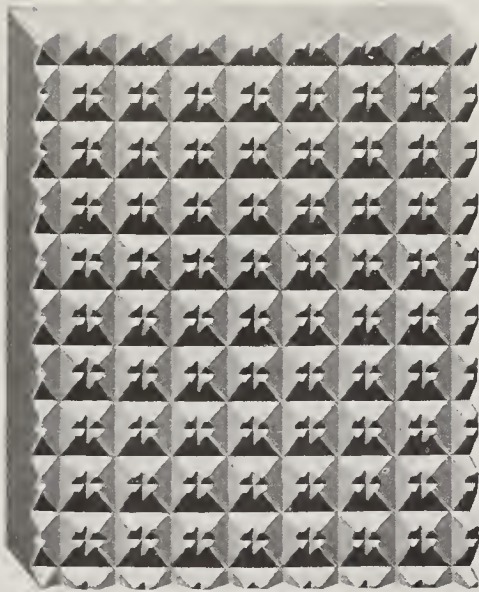


Sidewalk Glass Lenses

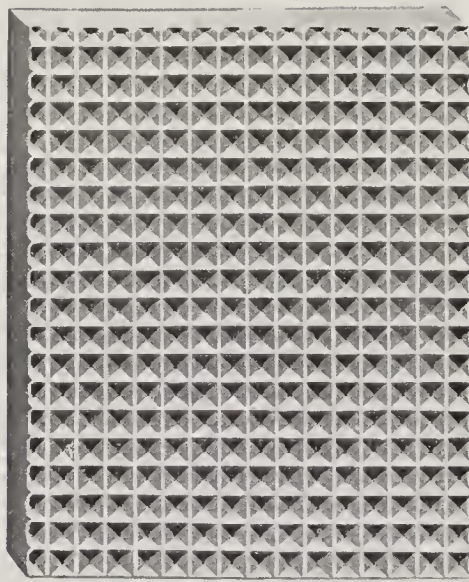
PITTSBURGH PLATE GLASS COMPANY



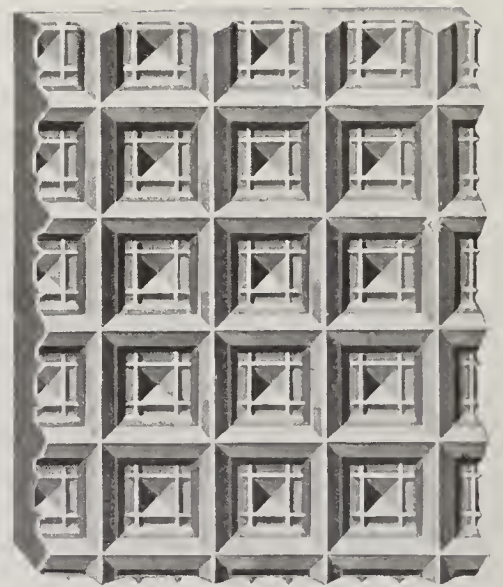
PRISM PLATE GLASS



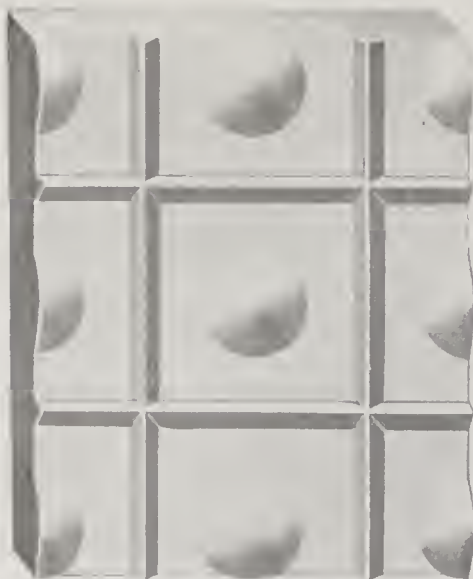
APEX GLASS



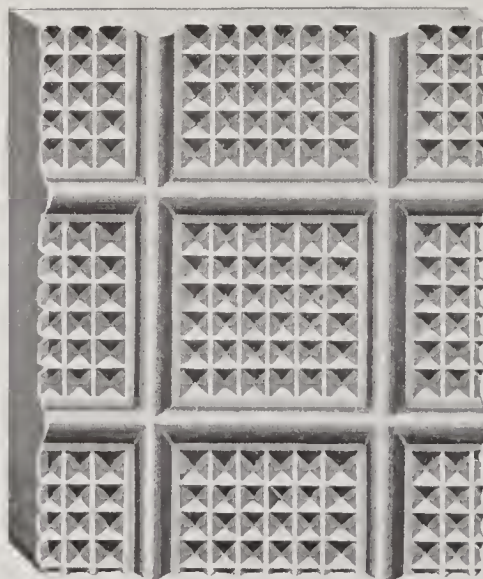
STYLE O—1. IMPERIAL



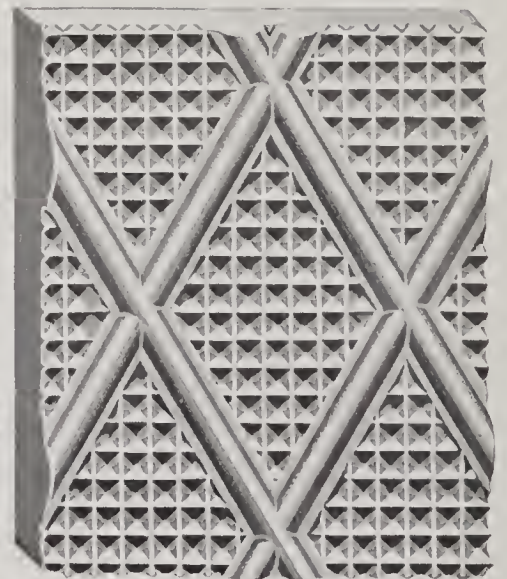
STYLE O—2. IMPERIAL



STYLE O—3. IMPERIAL



STYLE O—4. IMPERIAL



STYLE O—5. IMPERIAL

Ornamental Polished Plate Prismatic Glass

PRISM GLASS

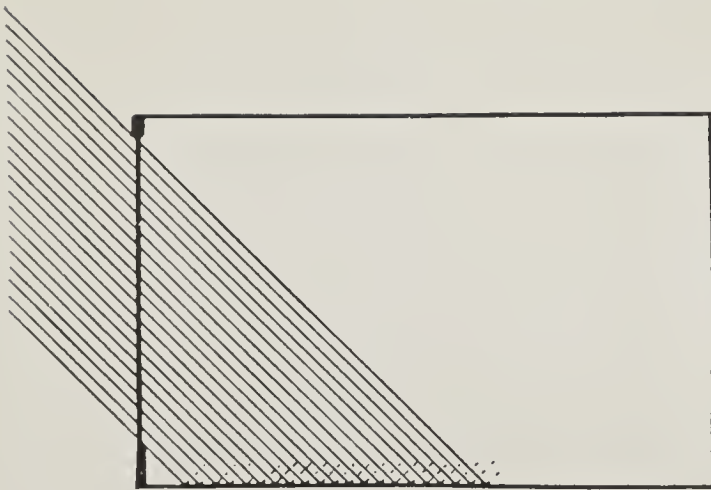


Fig. 1

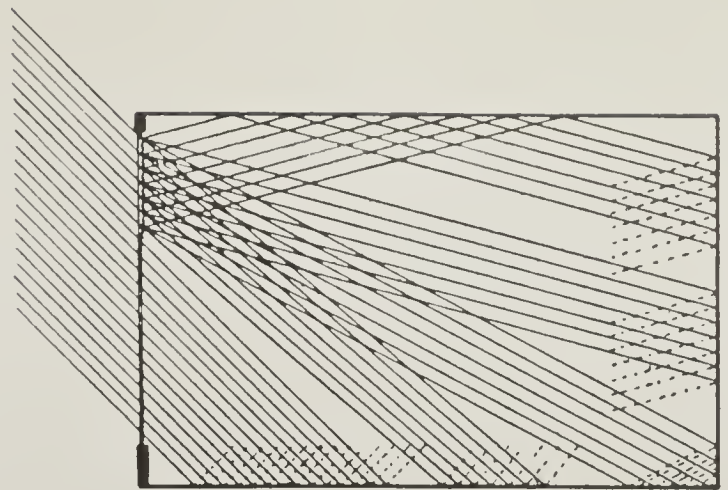


Fig. 2

SCIENTIFIC EXPLANATION OF THE PRISM

WHEN transom sash are set with 3-Way Luxfer Pressed Prism Tiles, the entire room is daylighted. Plain glass, on the other hand, permits the lighting of only the part adjacent to the window. The effect of the prisms is to bend up the light rays and project them to the farthest corners.

This use of the prism is made possible by a fundamental law of optics. Light rays always travel in straight lines unless reflected or refracted. According to one law of refraction, when light rays pass obliquely from one medium into another of different density, they are deflected, but upon passing *through*, and re-entering the original medium, they are restored to their original direction, *provided the planes of approach and of exit are parallel*.

When light rays pass through a sheet of plain glass (figure 3), they are refracted toward the perpendicular to the surface as they enter the glass, and away from the perpendicular as they leave it; the angles of deflection being determined by the angles at which the rays strike the two surfaces of the glass. But, as these surfaces are parallel, the resultant direction at exit is the same as that of approach.

In figure 5 the rays approach the prism surface at the same angle as the angle of approach in figure 3, but, because the second surface of the prism is not parallel, but at an angle, to the first, they still further change their direction as they leave, different-angled prisms giving different resultant directions.

The commercial prism is a series of small prisms moulded into the face of the tiles. These prisms, in the 3-Way Luxfer Tiles, are of different angles, so as to bend the light in different directions.

Figure 1 shows how light passes directly through an ordinary pane and is reflected by the walls.

Figure 2 shows how light passing through a plain glass window with a 3-Way Luxfer Transom above is bent up by refraction in new directions, searches out and daylights every part of the room, and is reflected from every wall. Figure 4 shows this in another way.

3-Way Luxfer Pressed Prism Tiles are made in two types: *Luxfer*, or *Flat Back*, for average installations, and *3-Way*, or *Lens Back*, for locations where daylight must be gathered from sides as well as from above.

Only experts should be consulted, in order that prisms of proper angle be selected, as is essential.

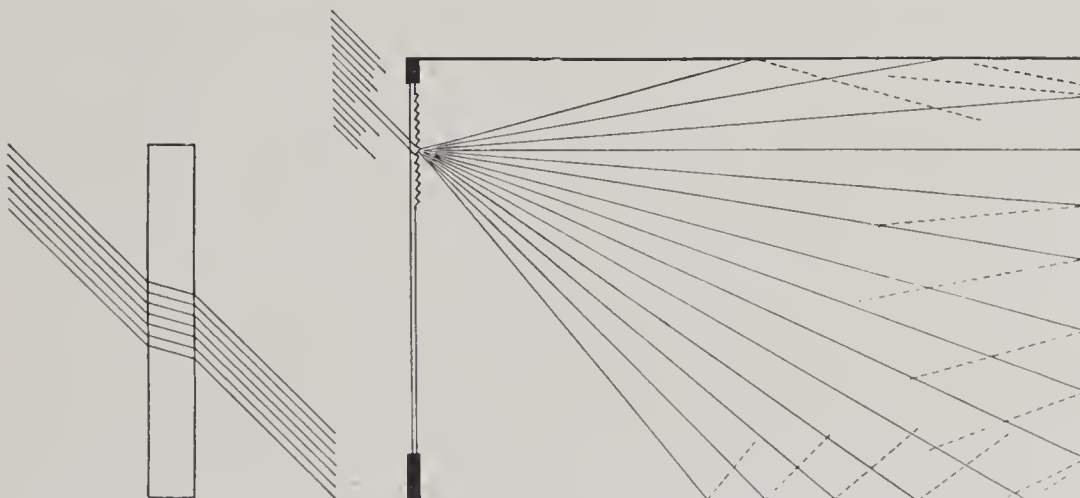


Fig. 3

Fig. 4

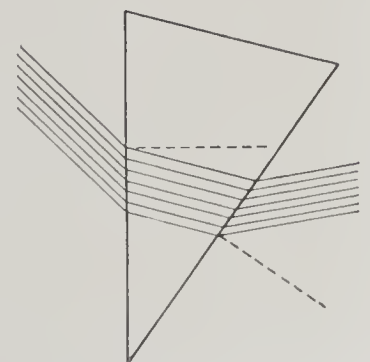
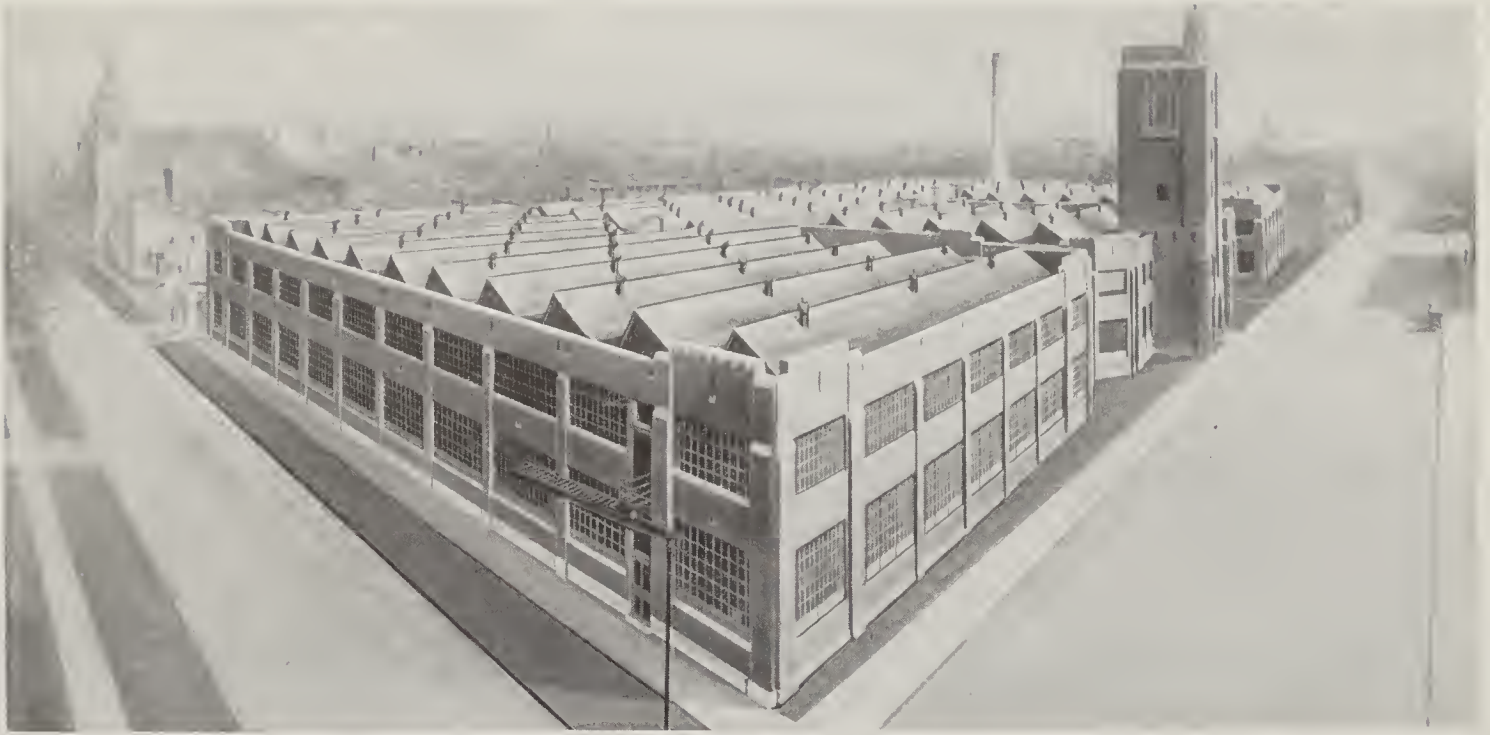


Fig. 5

PITTSBURGH PLATE GLASS COMPANY



Wire Glass Saw-Tooth Lights

The modern saw-tooth lights, that give a northern exposure and thus obviate the unpleasant effects of direct sunlight, frequently are set with wire glass. The lower picture shows the degree of daylight illumination thus secured.

WIRE GLASS

WIRE GLASS is a very modern utility. It was hardly known until the late 'eighties, but its surpassing value as a structural material has brought it into such general use that today the volume of production is amazing.

Wire glass is used in various types of buildings, ranging from factory construction, where

the rough and ribbed patterns are serviceable, to structures of highest class, in which polished wire glass is employed for windows, elevator doors, and the like. Usually it is set in metal frames, rather than in ordinary wood sash. Where light is a factor, wire glass sometimes takes the place of wood or other opaque materials for partitions,



WIRE GLASS



Ribbed Wire Glass Daylights this Immense Pier

In the three divisions — Head Section, Freight Section, and Outer Section — of Chicago's great Municipal Pier, which extends 3000 feet into Lake Michigan, upwards of 100,000 lights of Ribbed Wire Glass admit and diffuse the sunlight.

as the figured or pattern-surface wire glass is translucent without transparency. As all the decorative forms of pattern and figured glass can be supplied in wire glass, its use aids materially in brightening forms of factory construction that without it would be most unattractive.

Wire glass is quite obviously the material to be used for safety, because its wired construction

gives it great strength. For this reason it should be specified for skylights and similar glass coverings, as also for elevator shafts, stair walls, factory roofs, and similar purposes.

HOW WIRE GLASS IS MADE

Wire glass is cast and rolled into sheets like plate glass, and the wire is made a component



Wire Glass in Doors and Transoms

Garage and factory doors and transoms must withstand violent impacts without shattering; wire glass installation prevents personal injury, and property loss.



Figured and Polished Wire Glass

In hospitals the strength of wire glass, as well as the simplicity and beauty of the polished and figured styles, makes it singularly available for use in elevator doors and other passageway doors and partitions.

part of it by introducing the mesh while the hot glass still is plastic. There are three methods for imbedding the wire mesh, as follows:

I. SHUMAN PROCESS

After the molten glass is poured on the casting-table and rolled out, the wire mesh is spread out upon the plastic sheet and pressed deeply into it by a method which at the same time smooths the surface.

II. APPERT OR SCHMERTZ PROCESS

A sheet of glass is rolled to half the desired total thickness. The wire mesh is laid on it, and a second sheet of the same thickness as the first is poured and rolled on it, thus producing a solid sheet with the wire mesh in the middle.

III. CONTINUOUS OR SOLID PROCESS

The wire mesh is stretched and held firmly on the casting-table, so adjusted that it is suspended at a desired height above the table sur-

face. The molten glass is poured and rolled over it, thus producing a solid plate with the wire mesh firmly imbedded inside.

ORNAMENTAL WIRE GLASS

All the rolled figured glasses can be cast and rolled with wire mesh, and this is a favorite form in the case of buildings that make any pretensions to beauty.

Prism glass also can be furnished with wire, and various forms of plain transparent wire glass are rolled in such patterns as plain corrugated and other designs that have the prismatic property of diffusing or redirecting light.

Wire glass construction may be wholly transparent, semi-obscure, rough on one side or on both, or polished. Thus its value ranges from usefulness for walls and saw-tooth roof construction in factories, where utilitarian service is the end in view, to highly decorative glazing for the interior of the most elaborate buildings, where strength is required but where beauty also is a consideration of first moment.

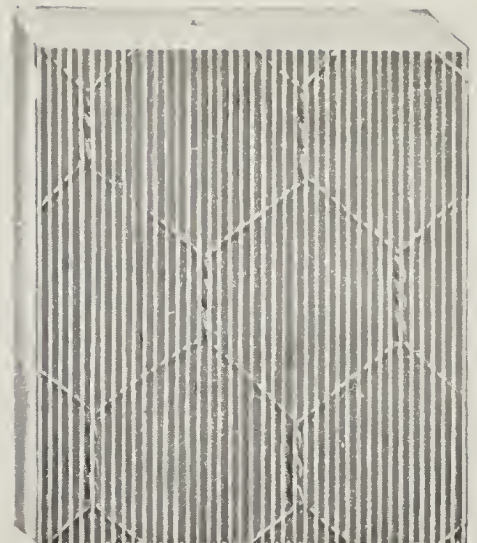
WIRE GLASS



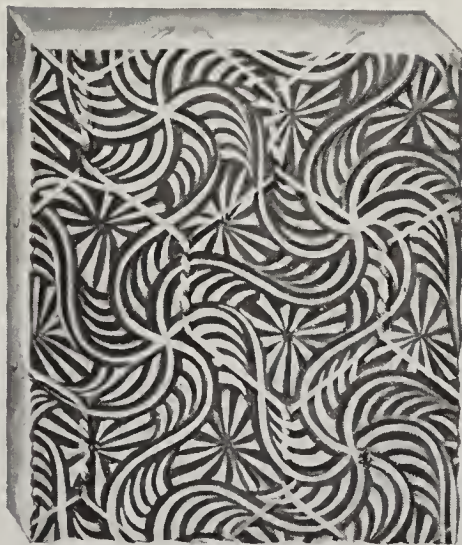
POLISHED



ROUGH



RIBBED



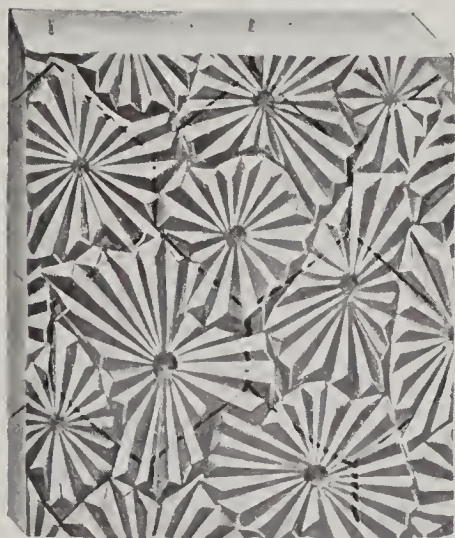
MAZE



SYENITE



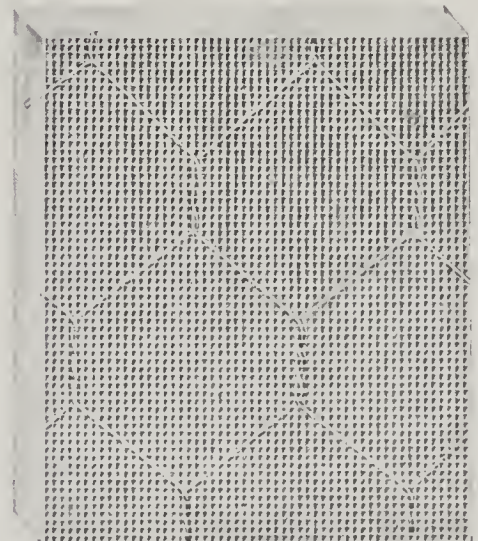
ROMANESQUE



MURANESE



PENTECOR



FACTROLITE

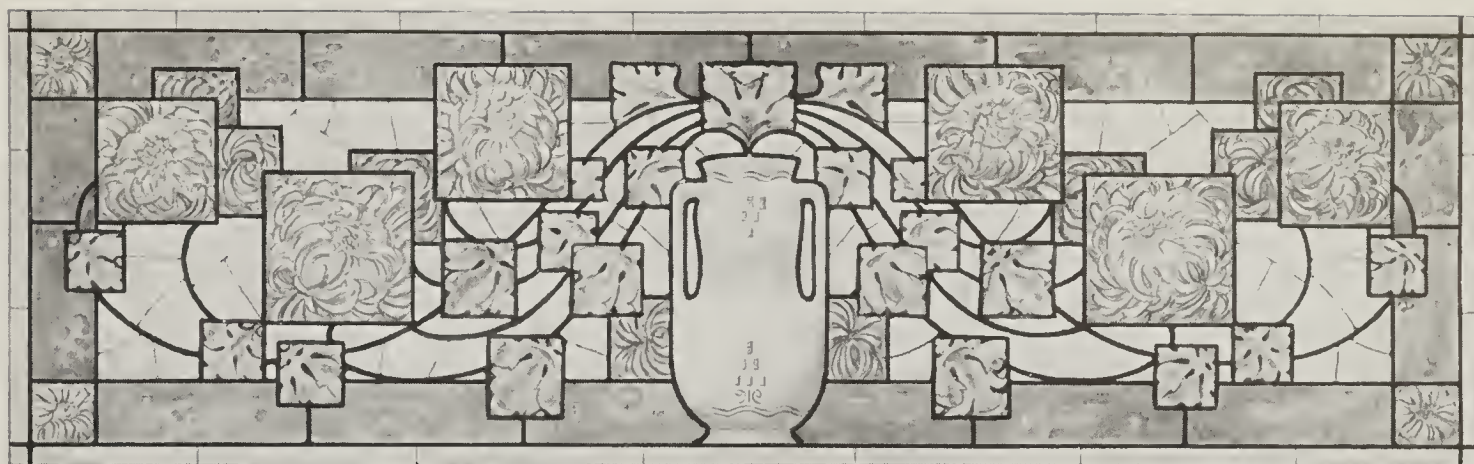
Various Styles of Wire Glass

Wire glass as well as plain glass may be finished in various patterns, thus giving all desired variety in decorative effects. All the patterns here shown can be supplied.



Laded Glass Curtain Designs

In this illustration is shown an effective set of leded glass curtain designs, composed of clear glass with delicately-tinted and iridescent color blocks. These windows have become extremely popular; dispensing altogether with lace curtains, the glass is carried out in colors to harmonize with the draperies and the general color scheme of the room. In the middle foreground may be seen two leded glass lanterns in keeping with the window designs.



LEADED GLASS

CLEAR, STAINED, AND COLORED

“LEADED GLASS” is a term referring to a method of treatment, rather than to any particular kind of glass, or indeed, to any particular metal as a setting for it. Inasmuch as the purpose of this treatment is almost exclusively ornamental, it is natural that only the finer kinds of glass, or in other words, plate glass quality, can consistently be employed.

In the popular idea, the term leaded glass no doubt generally suggests the rich stained-glass compositions that illuminate the windows of libraries, churches, and the like, in the designing of which art is unfettered by financial considerations. It is a fact, however, that leaded glass is available also for many modest forms of decoration, interior and exterior; that it requires neither stained nor colored glass, but is adapted admirably to interpreting the forms of art that find their expression in simplicity.

Any plain transparent plate glass can be used with excellent results in leaded form, as likewise all the various kinds of semi-obscure and figured glass. The term “leaded” does not signify, furthermore, that lead is of necessity the metal employed; harder metals, such as zinc and copper, also are used to a considerable extent.

Leaded glass, owing to the fact that it must be cut into pieces of irregular shape, each of which must have its own framing of metal, falls within the manufacturing department of the glass plant, and many special, conventional designs in leaded glass have become staple products. Thus every architect, interior decorator, cabinet-

maker, and furniture manufacturer has almost indefinite latitude, as to the variety of designs available, in the economical employment of leaded glass decoration.

In any glass-work built up of metal-joined pieces, the leading itself is a real element in the beauty of the composition. Whether the glass be colored or clear, and no matter what design the whole may represent, the lines of the leading never should be considered as an interference with the treatment of the subject, but, rather, as giving additional values. In some cases, for example, lines of unusual weight may add distinction and impressiveness.

So well recognized was this principle by the makers of medieval church windows that many of the most famous designs in stained glass were based wholly upon the lines of the leading. In succeeding periods, as the art declined, the workers manifestly began to treat the leading as a defect, or at least an obstacle. More and more they tried to make the leaded stained glass look like a painting.

In yielding to this cardinal error, the vital spirit of leaded glass art was lost. This art, whether colored or clear glass be its medium, is a decorative system that belongs exclusively to glass, and should imitate no other system.

Thus clear glass may be used for decorative effects almost unlimited in variety and produced entirely by the leading. The lines of metal may form an intricate pattern, or one beautifully simple. They may be fantastic, or they may



Clear Leaded Glass Grill Design

This illustration presents an excellent example of a clear leaded glass grill design widely used in Colonial houses.



Curtain Design

An example of curtain design using clear or semi-obscure glass in delicate tints, to harmonize with the draperies.

employ some simple geometric form indefinitely reduplicated—one of the earliest revealed principles in art, and one never superseded.

Clear glass in a great variety of such leaded designs is produced by the Pittsburgh Plate Glass Company. From clear polished plate to the same brilliant glass with beveled ornamentation is only a step, but it is one that opens up a wide, new field in the development of leaded glass designs, a field singularly rich and diversified.

Proceeding a step further, we come to the clear leaded glass with colored decorations, and then to the leaded all-color colored glasses, the leaded mosaic opalescent glass, the leaded opalescent painted glass, and so on to opalescent and cathedral glass. These latter belong to the discussion of stained and colored glass that follows.

There remains, however, another use for leading, growing year by year in favor as the economic value of scientific lighting compels recognition: this is in connection with the prism glasses. Prism glass, cut in elegant patterns and set in hard metal bars, constitutes an adaptation and a combination that links true art with the very highest degree of utility.

LEADED GLASS



An Artistic Office.

This illustration shows an artistic use of polished plate glass set in leaded panels. The view from the inside is not seriously obstructed, while from the outside and especially from a distance objects on the inside cannot well be observed.

STAINED AND COLORED GLASS

BY THE use of the terms “glass painting” and “painted glass,” specialists no doubt have contributed considerably to the current misapprehension as to the precise character of colored glass. The two terms have been used loosely to denote two things entirely different. Literally, one would imagine that “painted glass” was the art of painting a picture or a color scheme on a piece of glass, whereas most artists in using the expression have reference to pictures or designs built up with colored glasses that have been stained during manufacture.

Glass that is to be leaded frequently is in fact painted, but the paint used is of like substance with the glass itself, and in the process of firing actually becomes a part of the glass. This painted work is quite unlike that employed in commercial sign and decorative glass painting.

The art of painting with brush and pigment on glass is one widely practiced, especially for the commercial purpose of advertising signs, decorative panels, and similar modern products.

But this is a field that does not really concern the glass-maker. It is simply the same kind of painting that is done on canvas, although glass lends itself remarkably well to striking effects. Such painting can be done on any kind of glass, and a measurably high, specialized technique has been developed.

The masters of painting on glass recognize as fundamental the fact that they are working on an opposite principle to that underlying the picture made of stained glass. The painter on glass lays a rich, obscuring medium on the glass. No matter how delicate and luminous his colors may be, or how dainty his treatment, he must superimpose another surface on the surface of the glass itself. This may enrich the glass, obscuring it but little to the ordinary eye; but actually there has been interposed to the light a material foreign to the glass itself.

Stained glass, on the contrary, is inseparable from its color. The color is part and parcel of its substance. Instead of presenting a foreign



French Windows

In this attractive room the French windows are glazed with polished plate glass in leaded panels. In a room of this character shades only are used, the artistic treatment of the windows obviating the need for curtains or other draperies.

material to the light, it presses the sunlight into service as painter. In truth, a very exact name for stained glass would be *color-lighted glass*. Its color has been diffused throughout its molten substance. It is truly a child of flame, for it seems to hold forever some of the fierce, splendid fire that gave it birth.

The coloring of stained glass being produced in the furnace, it is not possible to apply the colors known to the artist who works with the brush. Every color is a chemical compound, and in the intense heat of glass-making all commonly known colors would disappear or change into undesired hues.

Therefore the glass-maker who wishes to produce a red, for example, has no such simple resource as that of mixing red pigment into the batch. The coloring materials required for his use are substances that look quite unlike any color that he hopes finally to get; they are chemicals which under fierce heat will break up, rearrange themselves in new combinations, and thus develop into color.

This makes the task highly difficult, for even when the theory of producing a given color is

well understood, there are a thousand and one difficulties to be overcome. The chemical combinations are complex and produce strangely unexpected effects. But the successful result is an achievement as great as are the difficulties—the “fire color” is the most splendid color known to man; the magic of chemistry and heat has put into it the light of the sun itself.

The color-materials of the glass-maker are chiefly metallic oxides. In their natural state they would not suggest to the layman what glories of tint lie hidden in them, to be brought forth by the heat of the melt.

Of the oxides, the oxide of iron, or plain, common iron rust, is a veritable mother of colors. The colored canyons of the West are largely painted by nature’s iron rust and we get browns, greens, blues, yellows, reds, all from the self-same oxide, either by itself or in combinations.

It is this same oxide of iron that has produced much of the glory of the great cathedrals whose arched and rose windows bring something of Heaven’s sublimity near to man.

The glass-maker produces his wonderful reds by mixing with the batch in the melting-pot a



Church Windows

The windows shown here are of modified antique design appropriate for the modern Gothic edifice. The pictorial subjects are taken from the life of Christ.

combination of oxide of iron, sub-oxide of copper, a little gold, and silicate of sodium, all in varying proportions.

For blues, he introduces an addition of cobalt, zaffre, and copper.

His greens are won by using various oxides of iron, peroxide of copper, and chromium oxide.

By adding oxide of manganese, oxide of uranium, and perhaps some antimony and silver, he makes the chemistry of heat give him glowing violet. And with oxide of iron, antimony, and a few other chemicals he produces the tints of orange, ranging through all the sunset hues of that gorgeous color.

The glass trade deals in many colors and tints of glass, known by such trade terms as Opal Glass, Cathedral Glass, and Opalescent Glass. All these are used for countless purposes, sometimes on a large scale but extensively in small form, as for lamp shades and ornaments.

CATHEDRAL GLASS

This is a cast and rolled glass, and is furnished in smooth surface or in an ornamental "hammered" effect produced by rolling a pattern into it while it is still plastic. It is cast in sheets approximately one-eighth inch thick, measuring about thirty by ninety inches.

OPALESCENT GLASS

Opalescent glass is made in smooth surface finish or granite surface, and is cast in sheets about twenty-six inches wide and forty to fifty inches long.

COLORLED FIGURED GLASS

The patterns obtainable in plain figured rolled glass (described elsewhere in this book) can be furnished in all standard colors and shades. There are also colored glasses, known as "pot colors," made from cylinder glass (window glass). They are described on page 184.



Chancel Window

This design depicts Raphael's Sistine Madonna, beautifully worked out in painted antique glass.

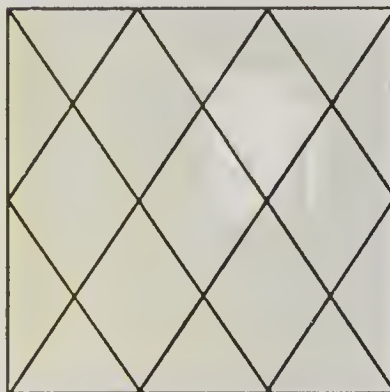
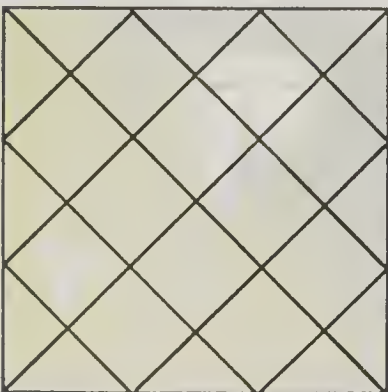
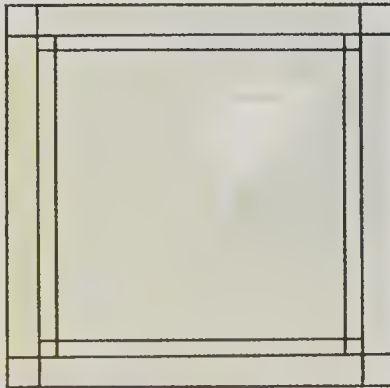
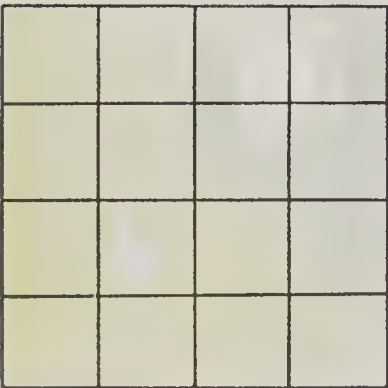
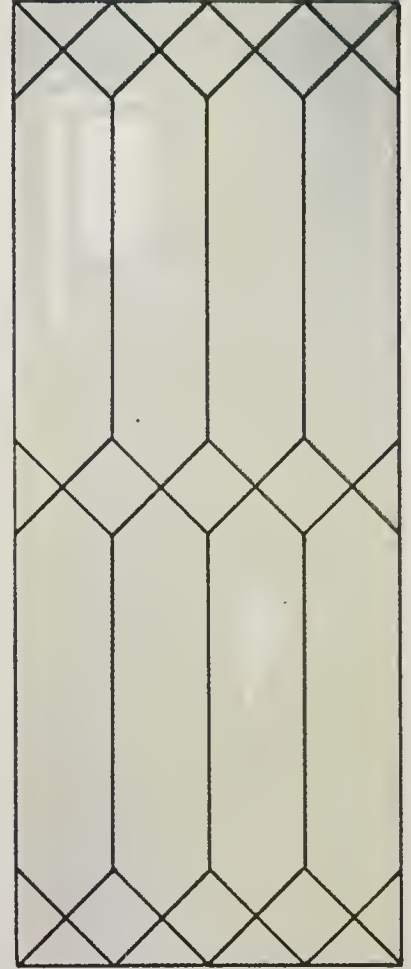
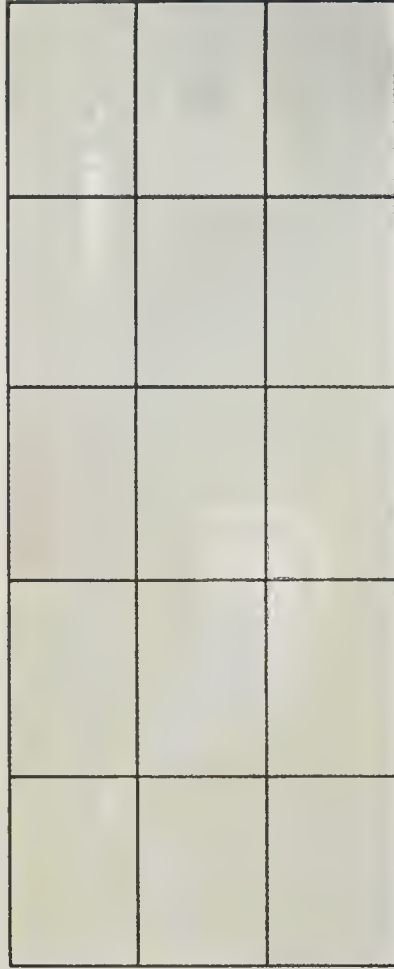
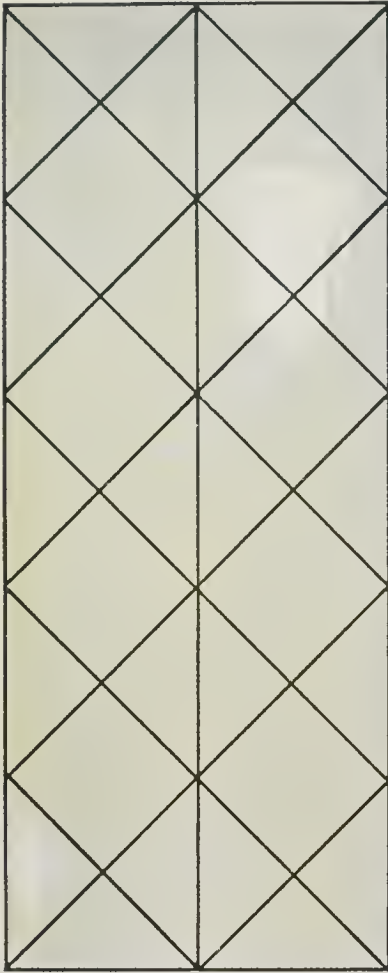
LEADED GLASS



Soldiers' Memorial Window

Designed for Knox Presbyterian Church, Calgary, Alberta, Canada. No fewer than 9982 pieces of antique glass were used.

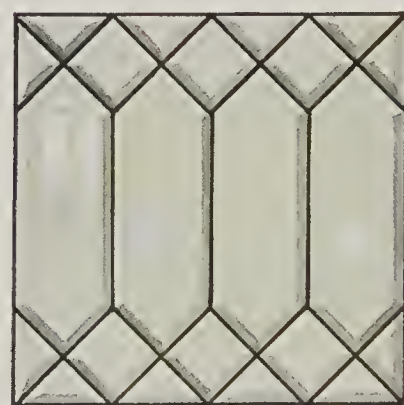
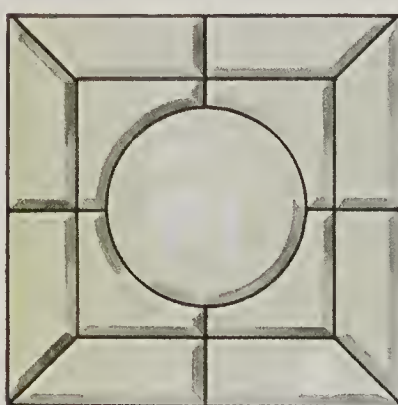
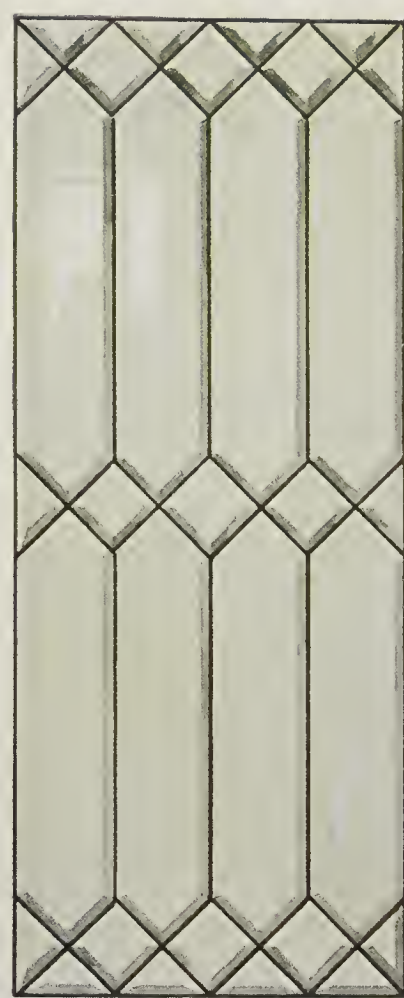
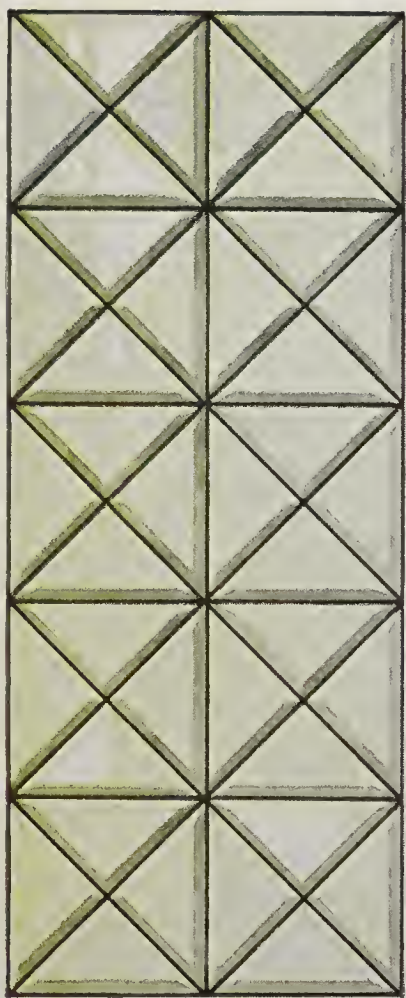
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For Residence or Public Building

Leaded glass window, Colonial type. Clear glass usually is used in windows of this class, although color schemes also are effective.

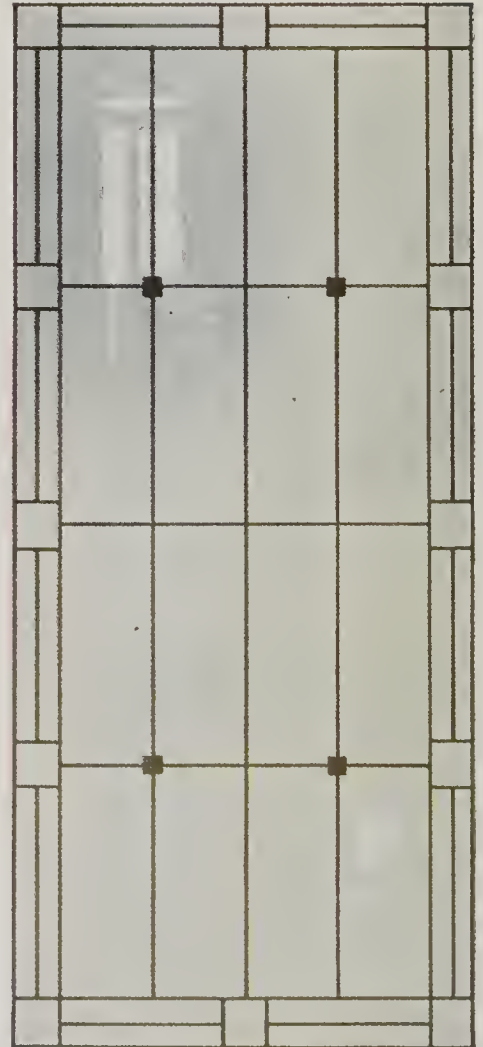
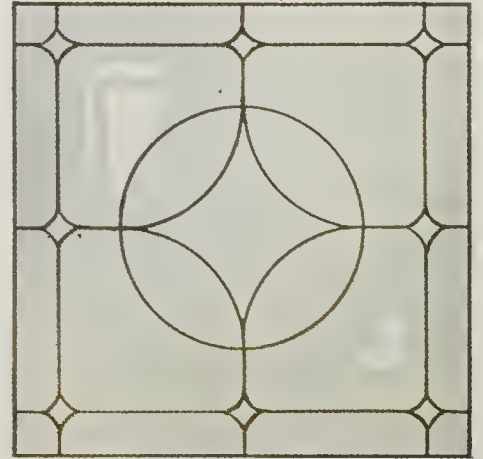
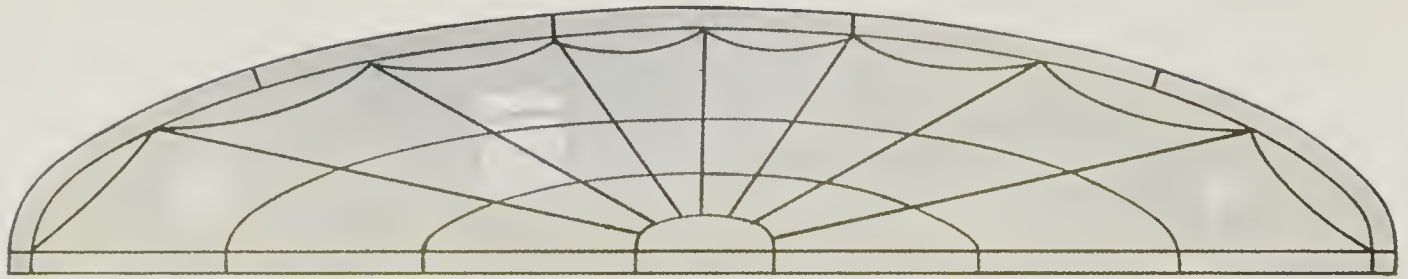
LEADED GLASS



Leaded Beveled Plate

This type of art glass usually is glazed in hard metal, copper plated, instead of in lead.

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Colonial Clear Glass Designs

Many interesting and artistic designs can be produced for window treatment in homes and public buildings.

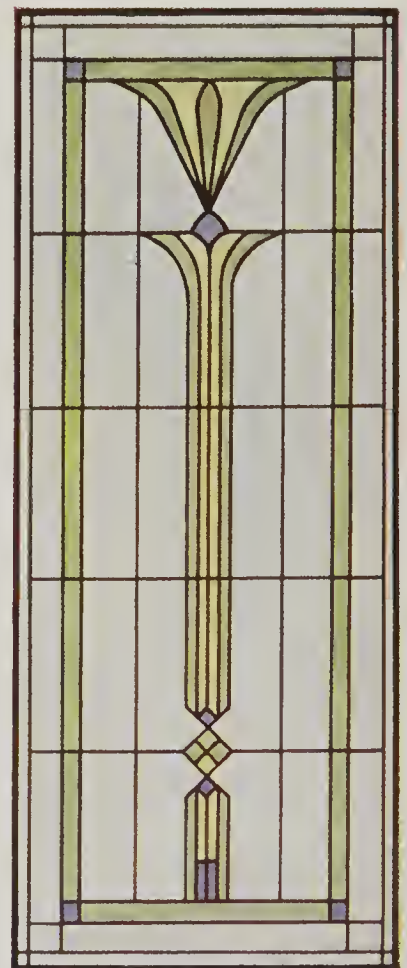
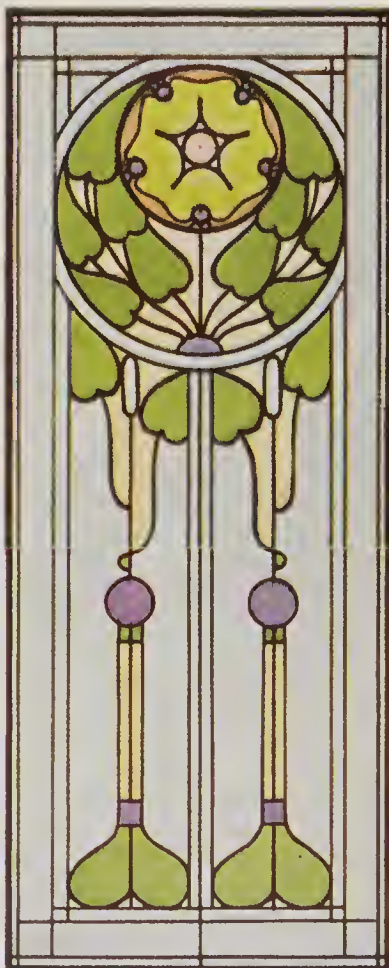
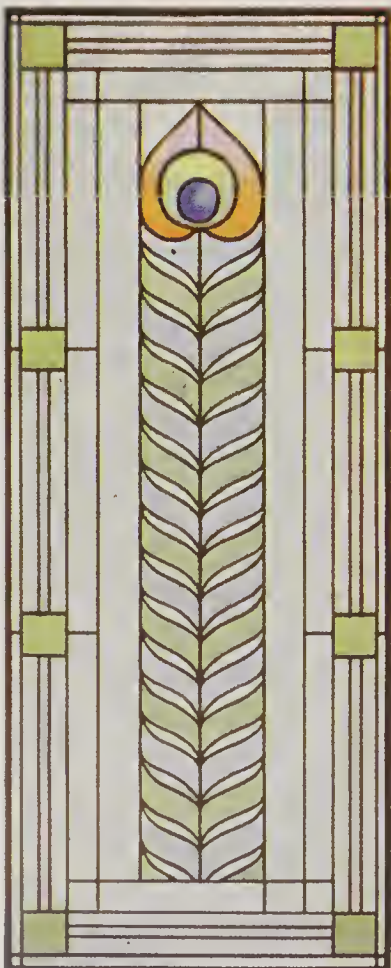
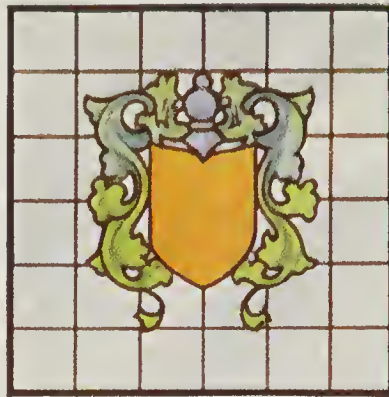
LEADED GLASS



Appropriate Transom Designs

These designs illustrate harmonious and effective uses of leaded opalescent and prism glass.

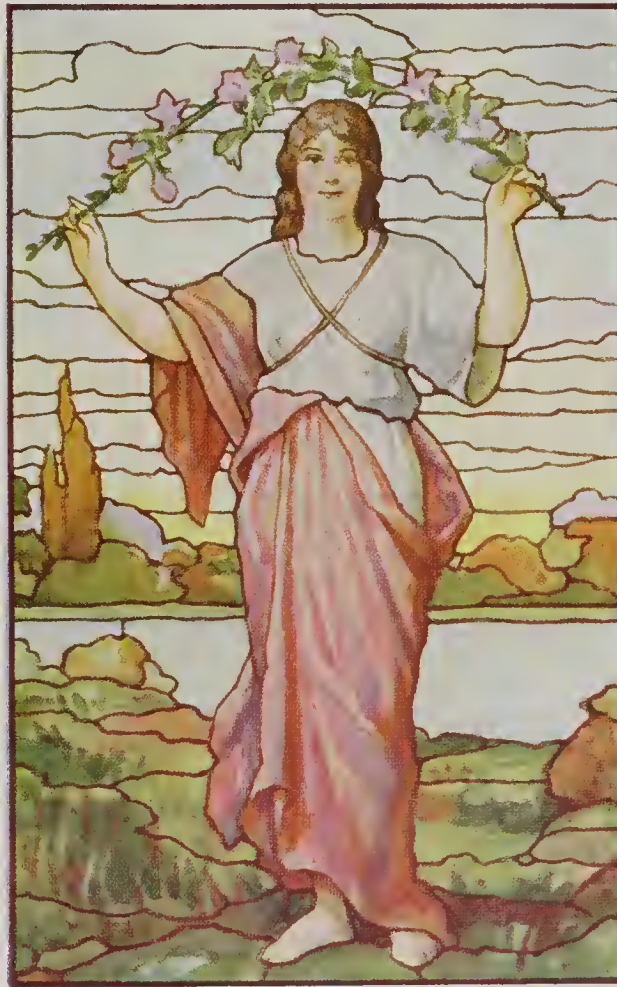
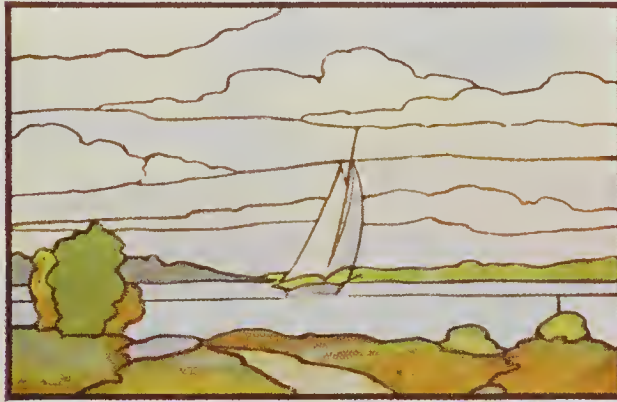
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Art Nouveau Panels

Some attractive panel designs in leaded clear and colored glass for stair-landing windows, dining rooms, and living rooms.

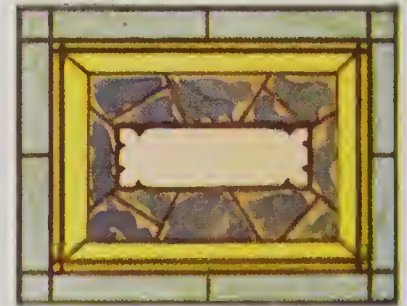
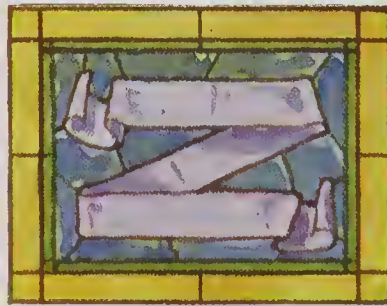
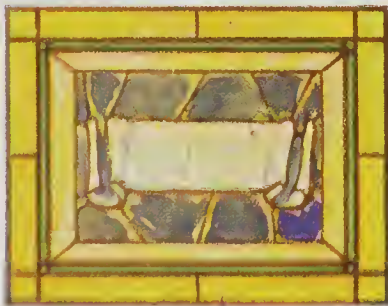
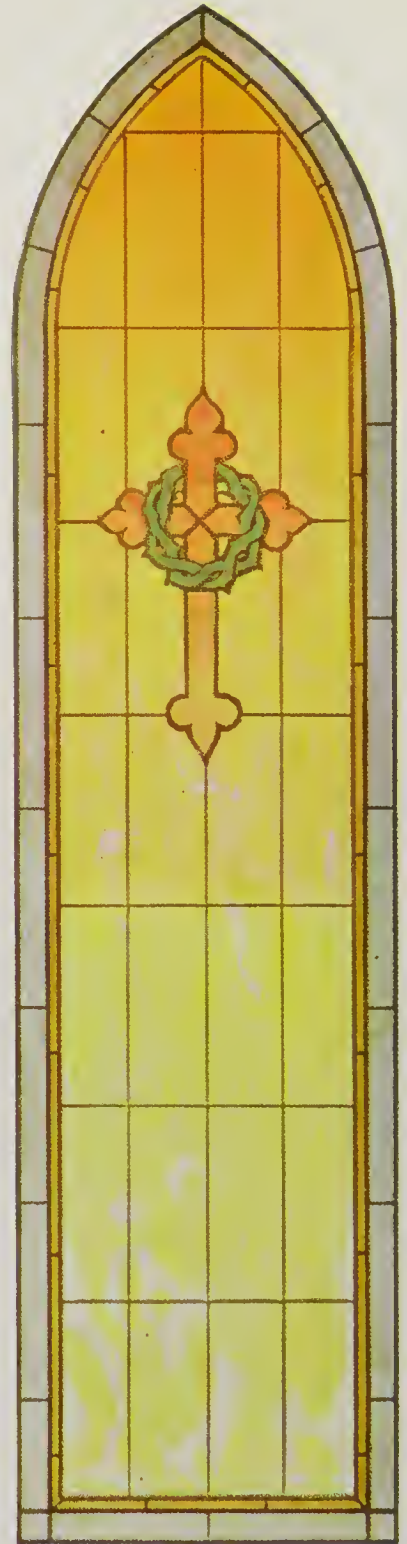
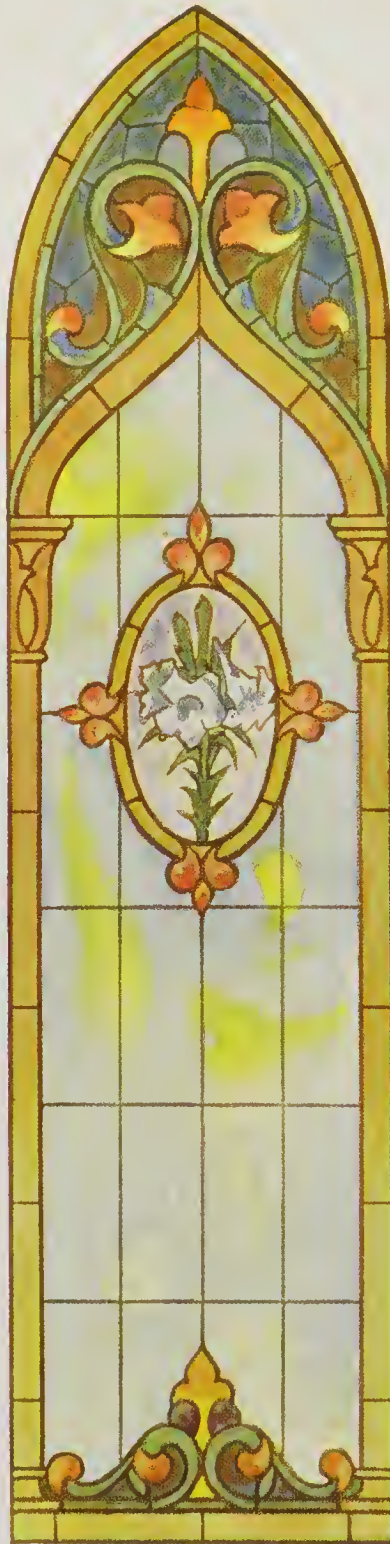
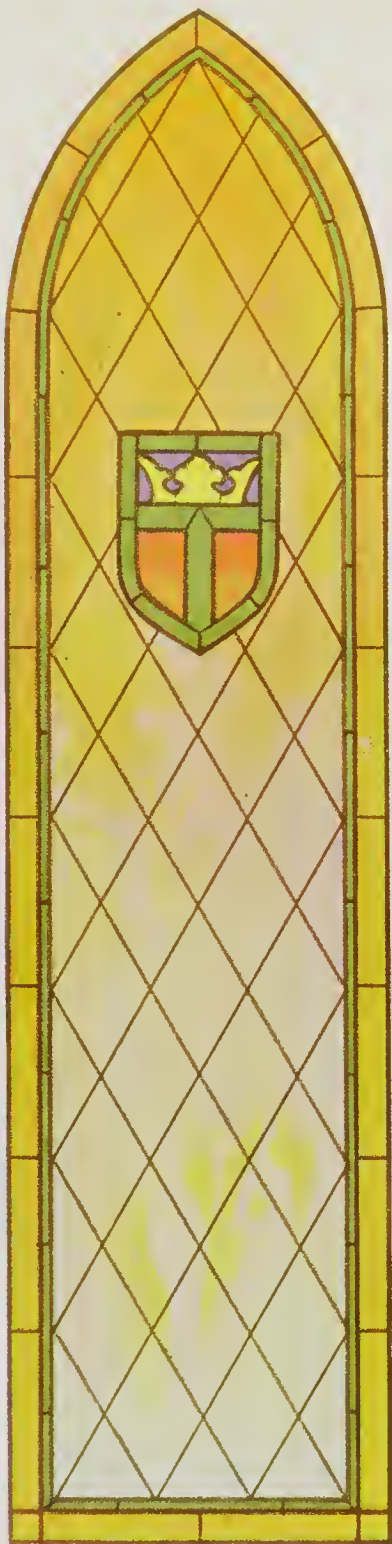
LEADED GLASS



Transoms and Special Windows

Several interesting designs in leaded opalescent glass, for transoms, dining-room, living-room, library, den, and stair-landing windows.

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Church Windows

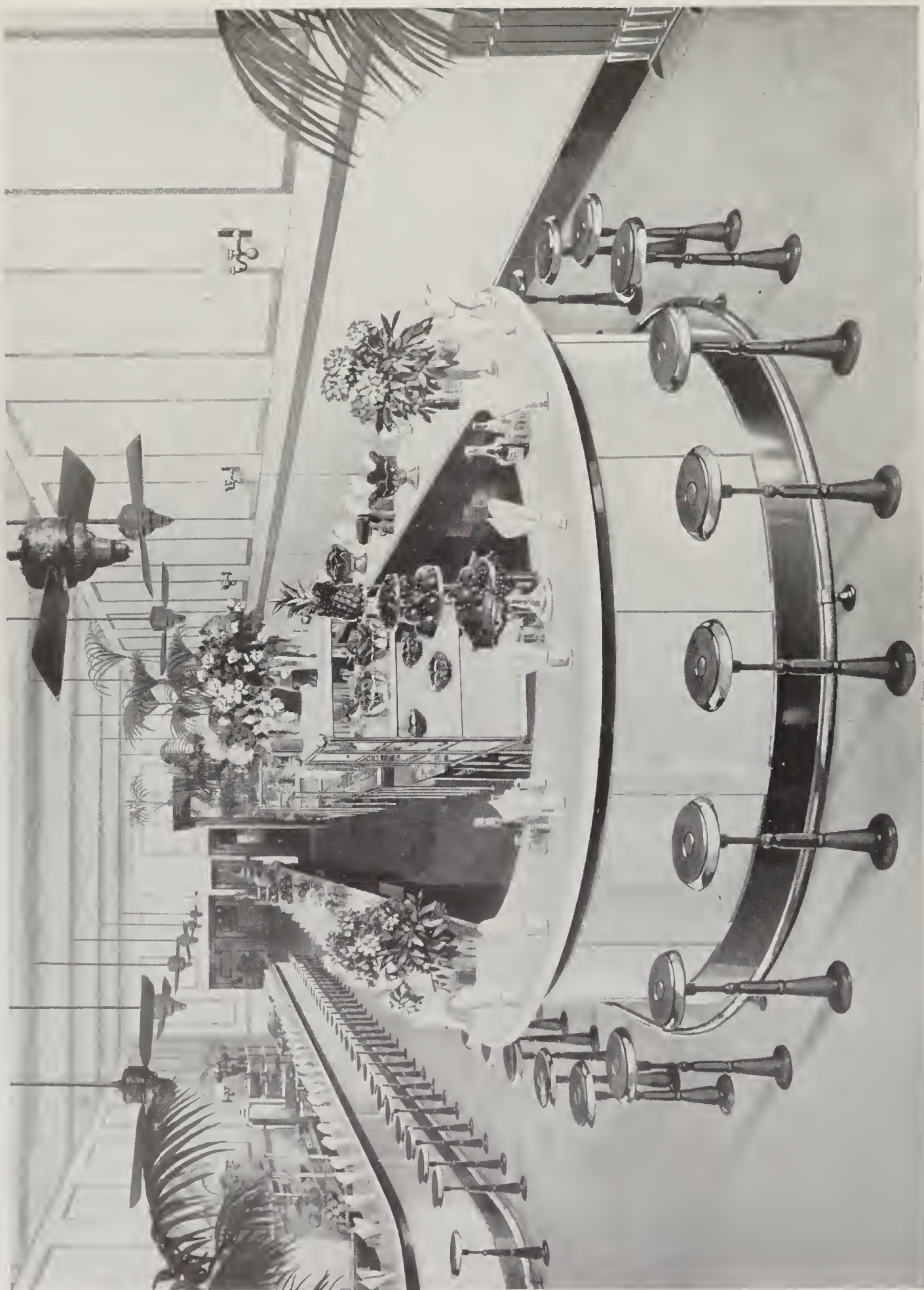
Many ornamental and interesting effects are obtainable through the use of opalescent and cathedral glass in combination.

LEADED GLASS



Church Windows

In these illustrations is shown effective use of opalescent, mosaic, and painted glass.



Spotless Appointments Put an Edge on Appetite

Here is shown an extensive use of Carrara and Black Glass in a modern restaurant. The wainscoting and walls are of Carrara with Black Glass trim; the tops and fronts of the counters are Carrara, with base and apron of Black Glass, while Carrara shelving is used on the display and service stands.



An Attractive Fountain

The swift service necessary at most soda fountains calls for a surface that can be cleaned easily and quickly. Polished Carrara Glass is ideal. The paneling of Carrara with Black Glass base and trim gives a strikingly brilliant effect.

CARRARA AND BLACK GLASS

BEAUTIFUL STRUCTURAL MATERIALS AVAILABLE FOR IMPORTANT USES

AMONG the highly important products of the Pittsburgh Plate Glass Company are the famous Carrara Glass, a beautiful white, opaque structural material, and Black Glass, which is exactly the same as Carrara, but has the appearance of polished jet. The nature and purity of the substances used to create these unique glasses are such as to achieve absolute permanence of color, for the white of the Carrara and the black of the Black Glass are inherent characters of these two products.

Carrara Glass is produced exclusively by the Pittsburgh Plate Glass Company. It is used generally in building construction and wherever marble is applicable, except where mouldings and decorative features are required. Both Carrara and Black Glass are widely used for table tops and counter tops in restaurants, drug stores, butcher shops, markets, and other places

where food products and beverages are dispensed and where cleanliness, economy, and permanent beauty are important considerations. They have innumerable other important uses, many of which are enumerated or shown in illustration in this volume.

Carrara and Black Glass are made from secret batches, which in a general way are the same as for plate glass, but with the addition of special chemicals to produce the colors and also to impart to the products their characteristic molecular structure.

While the batches are somewhat similar to the plate glass batch, the fusing and annealing are entirely different. The Carrara and Black Glass batches are subjected to melting conditions considerably longer than is the rule for plate glass, and the annealing covers from three to seven days, depending upon the thickness of

PITTSBURGH PLATE GLASS COMPANY



Scrupulous Cleanliness Wins Favor

Any grade of restaurant finds in Carrara Glass a material perfectly suited to its needs. The polished surface, non-porous and impervious to stain, is cleaned instantly by simply wiping with a damp cloth. Each diner is served on a spotless surface.

the material. These two factors—the different materials in the batches and the scientific annealing—give Carrara and Black Glass those special structural qualities which make them available for various uses in buildings, such as wainscoting and partitions, for example, for which plate

glass of similar thickness would not be practicable or appropriate.

Both Carrara and Black Glass are made in three surface finishes: honed, satin, and polished, in thicknesses ranging from one-half to one and one-quarter inches, in multiples of one-quarter.



Carrara Glass Wainscoting

In addition to its use for table tops and serving counters as shown, this picture gives an example of the use of Carrara Glass in a wainscoting.

CARRARA AND BLACK GLASS



An Air of Richness

The use of polished Black Glass for table tops gives the ice cream parlor an air of distinction. The Black Glass, giving depth and contrast to the color scheme, provides a rich decorative element.

A distinguishing and invaluable feature common to both these glasses is their absolutely true and even surfaces—made possible by a process of grinding which produces an exactitude of surface impossible by any other method with any other material. The honed finish gives the

glass a smooth finish without lustre. The satin finish produces the rich, soft, distinguished effect implied by its name. The polished finish results in a bright glassy surface.

A supreme merit of Carrara and Black Glass is that they are impervious to stain, will not



Minimum of Labor

This great industrial dining hall speaks for itself as to the practicability of Carrara Glass for the table top. Cleanliness is fundamental, yet it is also imperative that cleanliness be assured with a minimum of expense for labor. The rich, white surface of polished Carrara Glass is pleasing at all times and the care of it is simplicity itself.

PITTSBURGH PLATE GLASS COMPANY



Practical Elegance in the Cafeteria

Characteristic of American enterprise in meeting popular demand are the cafeteria and the quick lunch counter. The cafeteria pictured here has made extensive use of Carrara and Black Glass. The rich, dark table tops supply an element of style lacking in the average lunch room. The use of Carrara Glass for the steam tables is sanitary in appearance and in fact.

absorb moisture in the slightest degree, and because of the homogeneous structure of the material the different finishes are practically indestructible. Unlike marble, there is no deterioration of the highly polished surface of these glasses. Marble quickly stains because of its

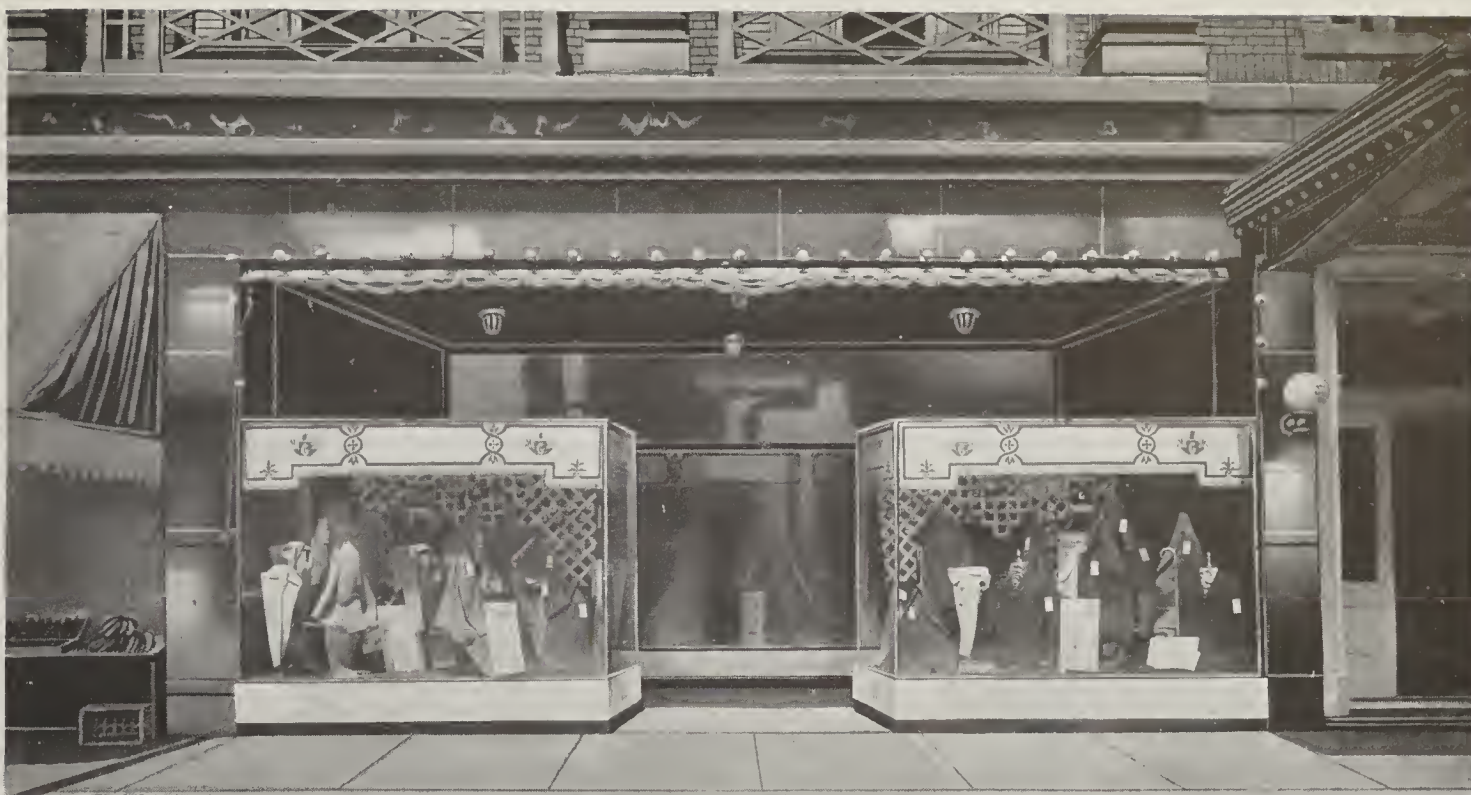
porous nature, the voids soon become filled with foreign substances, and the polish rapidly disappears. Polished Carrara, on the other hand, because of its non-porous, non-absorbent qualities, will not retain odors and is the ideal material even for urinals and like uses.



Carrara Glass and Marble

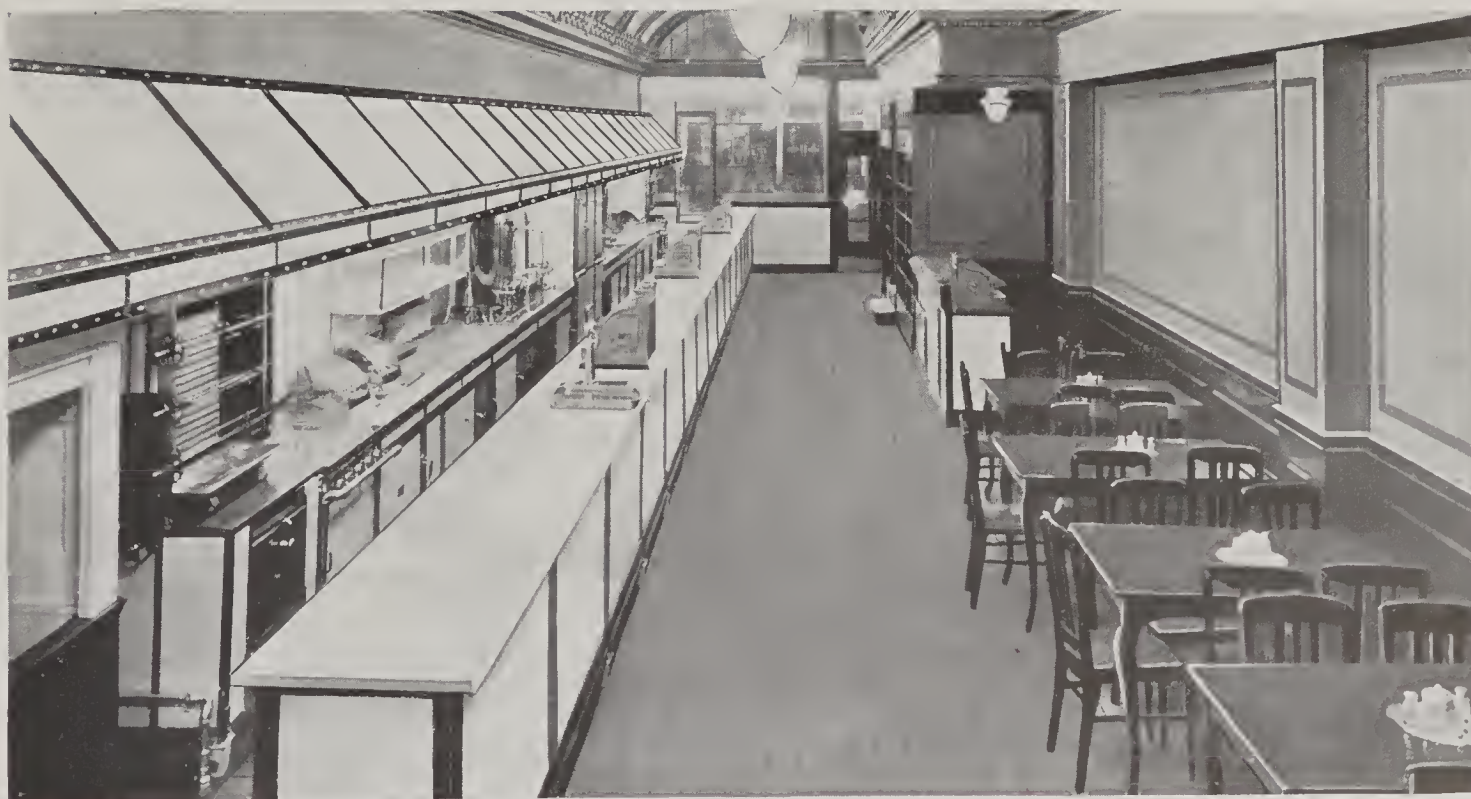
Under the magnifying glass the polished face of the Carrara Glass discloses its smooth, non-porous surface, while the marble reveals roughness and permeability to moisture and dirt.

CARRARA AND BLACK GLASS



Impermeable to Dampness

The possibilities of Carrara Glass and Black Glass are well represented in this illustration of a store front. The base of the window, upon which the frame rests, is of Carrara with a strip of Black Glass at the bottom. Marble often is used for a similar purpose, but Carrara has been found greatly superior. Construction of this sort has to be cleaned frequently—as a rule every morning—and it is essential that the material be impermeable to dampness.



Temporarily Clean

This spotless little rôtisserie, with its Carrara grill and its table tops and trim of gleaming Black Glass, presents a most tempting invitation.

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Black Glass Counter and Table Tops

Here is shown an extensive use of Black Glass in a modern quick-service restaurant. The highly-polished surface is easily cleaned and the black tops offer a pleasing contrast to the white bases, stools, columns, and walls.

Carrara Glass is worked and shaped by methods very similar to those employed in the working of marble, and although, as has been said, it is not available for mouldings or curved surfaces, it is thoroughly adapted to all flat work for which marble would be found practical.

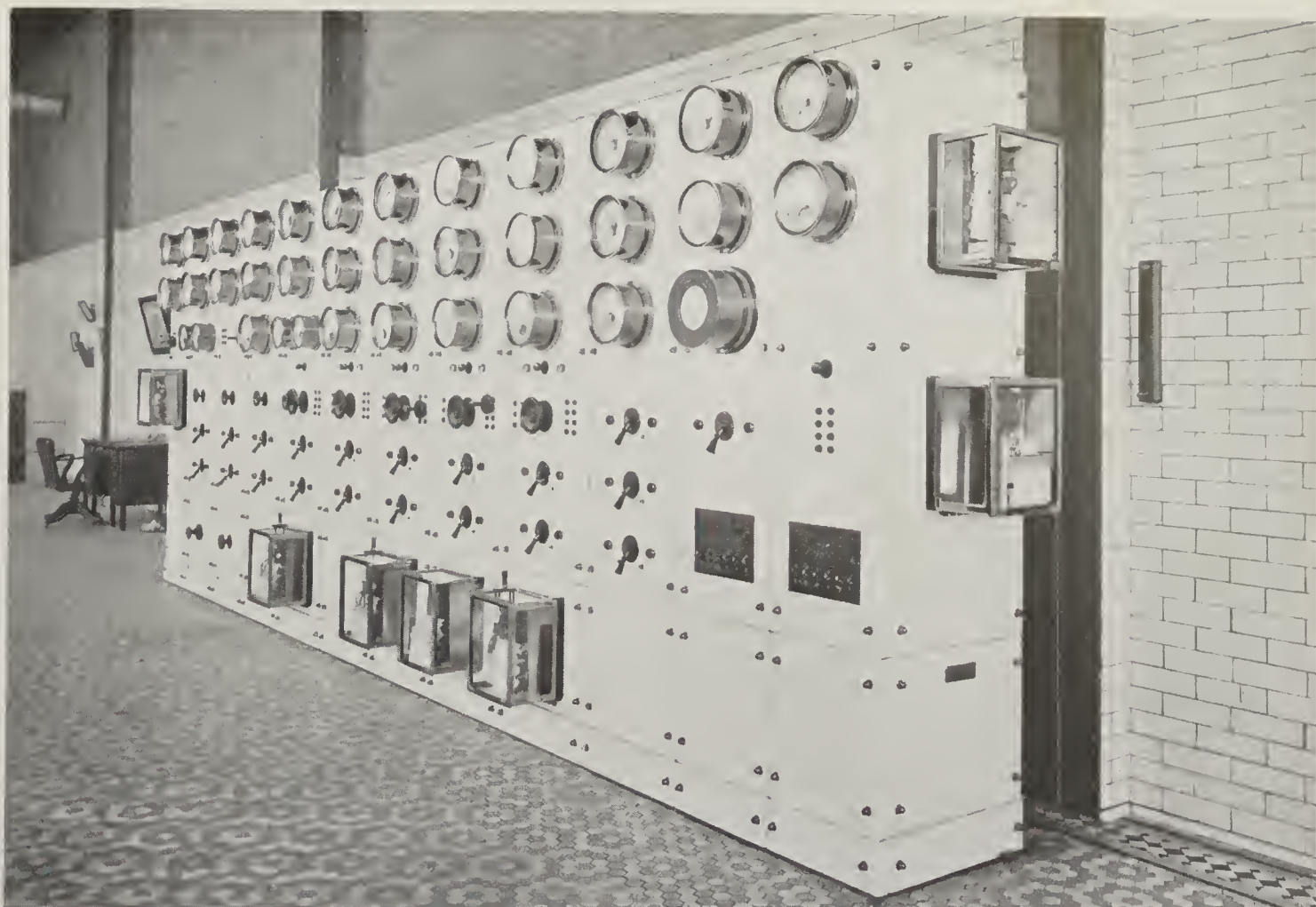
Carrara is useful for the wainscoting of corridors on many accounts besides the important one of its non-staining and non-defaceable surface. Compared with marble the cost of maintenance for Carrara is practically nothing; no expense is involved for bleaching and refinishing as is the case with marble. Carrara gives the corridors a permanent clearness and brightness of appearance, at the same time attractive and cheerful. For effective lighting in corridors, architects are coming more and more to rely upon Carrara, because its white, perfect surface reflects artificial light in a prismatic manner that greatly increases the illumination.

The cost of providing artificial light in such corridors is therefore reduced materially.

The honed finish is desirable for many special uses, such as the walls of hospital operating rooms, where it is of highest importance that light shall be ample but at the same time without glare or eye-distracting reflections. The surgeon, in performing the most delicate and critical manipulations known, must be assured of inviolate conditions. Walls of Carrara Glass in honed finish leave nothing to be desired in this regard, for its diffusion of light is perfect, while positive reflection is at the minimum.

The use of Carrara Glass or the Black Glass for table tops has spread rapidly in recent years. In many types of restaurants and in such establishments as welfare dining rooms, these materials have almost entirely taken the place of linen. The Carrara Glass department of the Pittsburgh Plate Glass Company has obtained

CARRARA AND BLACK GLASS



Carrara Glass Switchboards

Even where decorative considerations play no part Carrara Glass has important industrial values, as for example, in the switchboard of the engine room of a large industrial plant.

from certain public restaurants figures that show the annual expense of laundering linen covers for a table thirty by forty-eight inches to be double the cost of a Carrara or Black Glass top, to say nothing of the initial cost of the linen and of replacements. The same advantages and economies apply in varying proportions to counter tops in restaurants, packing and sorting tables in stores and factories, and innumerable other uses. The polished Carrara Glass owes much of its popularity also to the fact that it is practically impossible to mar or deface it.

It is not possible to enumerate all possible uses for Carrara or Black Glass, but the following obvious uses will suggest others:

Base and border for hotel corridors.

Wainscoting in buildings, stores, barber shops, bathrooms, toilet rooms, and operating rooms.

Table tops in restaurants, confectioneries, kitchens, and hospitals.

Interior walls, paneling, and ceilings for restaurants, food markets, and similar establishments where strict cleanliness is requisite.

Tops and fronts for counters and shelving.

Bases and tops for soda fountains.

Rubbing tables and other equipment for Turkish baths.

Partitions and stalls in toilet rooms and showers.

Deal-plates for banks and cashier windows.

Trim and other parts for show cases and for buffet tops.

Packing and sorting tables in factories.

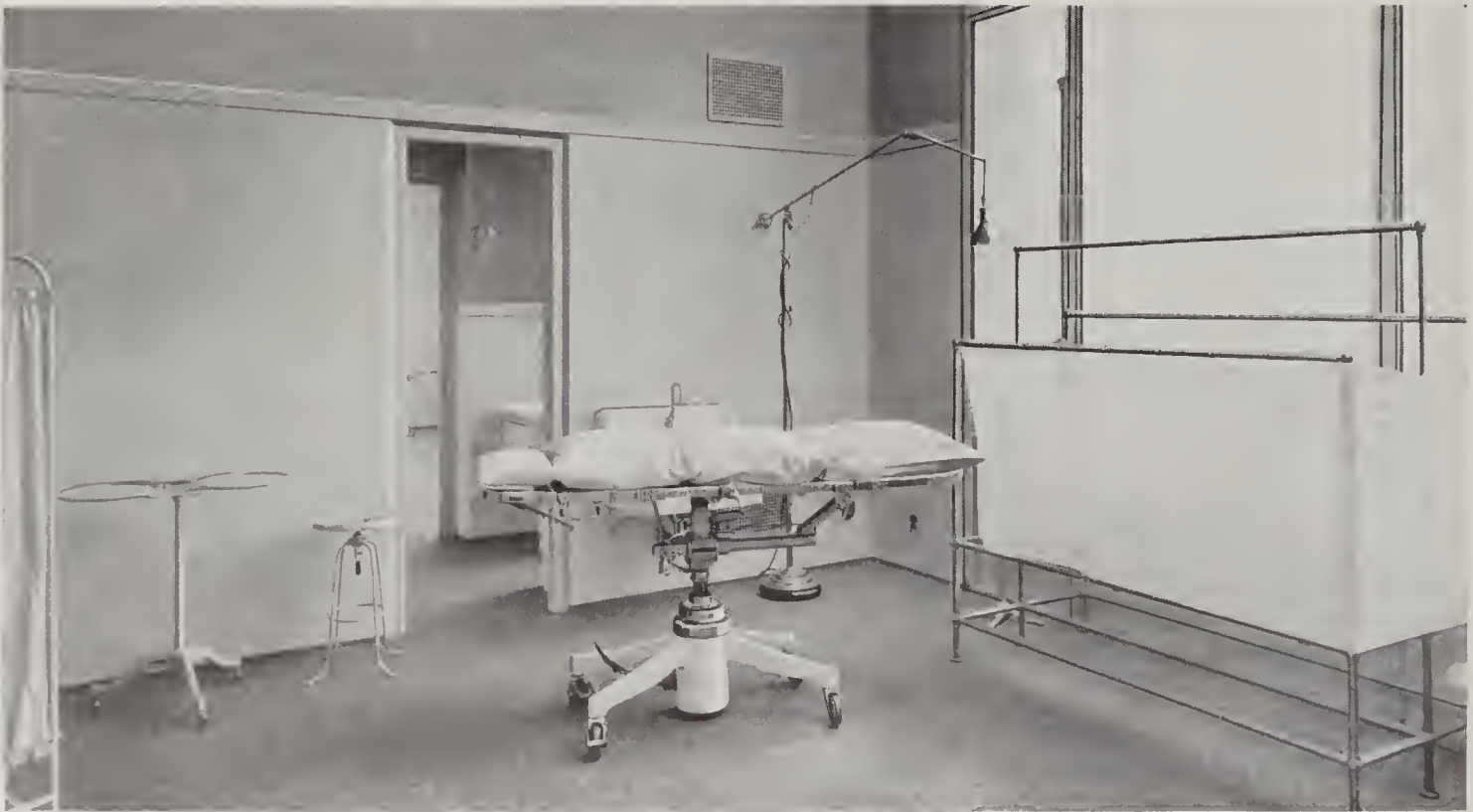
Scale platforms, drawing tables, coin plates for cash registers, signs and outside covering for metal store fronts.

PITTSBURGH PLATE GLASS COMPANY



Wainscoting in Office Buildings

An important use for Carrara Glass is as wainscoting in office buildings. Its gleaming surface and enduring structural properties are particularly desirable in a building not well supplied with windows, for the brilliant white expanse catches all available light and diffuses it without glare through the corridors or rooms.



Aseptic Walls for the Operating Room

The operating room here illustrated is an admirable example of the use of Carrara Glass with honed-finish surface. This imparts to walls and ceiling the same element of cleanliness that obtains in the surgeon's implements and apparatus. The honed finish provides a surface which is rich in appearance, will not reflect light, and is restful to the eyes.

CARRARA AND BLACK GLASS



Hygiene and Sanitation

Carrara Glass is unexcelled for purposes requiring the utmost in hygiene and sanitation, as instanced by this public toilet room in an up-to-date hotel. Unlike marble or other porous materials Carrara Glass is non-absorbent of moisture or odors.

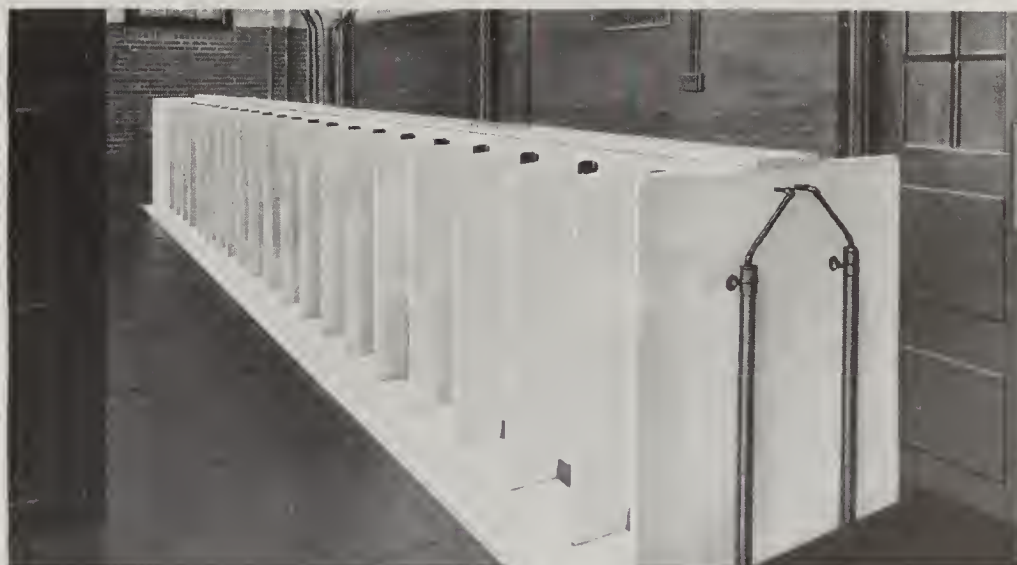
CARRARA AND BLACK GLASS SPECIFICATIONS

Wainscoting is made in $\frac{3}{4}$ -inch thickness, polished on one side and rough on one side; also honed on one side and rough on one side. For header pieces requiring exposed edges, plates are furnished with the back surface ground and properly gauged to thickness.

Partitions are made in $\frac{7}{8}$ -inch and $1\frac{1}{4}$ -inch thicknesses with both surfaces in any finish.

Trim for windows and doors and cap of wainscoting is made in $\frac{3}{4}$ -inch, 1-inch, and $1\frac{1}{4}$ -inch thicknesses, in all finishes.

Table Tops are made in any desired thickness.



Public Comfort Stations

No product known is so serviceable for the purpose here pictured as is polished Carrara Glass. Its smooth, hard, non-porous surface prevents defacement, absorption of moisture, and consequent retention of objectionable odors; it is easily cleaned, practically indestructible, and therefore widely used in public buildings, schools, hotels, and other large structures.



To Attract and Hold Trade

The wholesome appearance of unspotted cleanliness in the provision store is more than half the battle in merchandising perishable foodstuffs. Note in this model market how polished plate glass displays the meats in the refrigerating show case, how a background of pure white Carrara Glass sets off the toothsome hams and bacon-sides, and how Carrara and Black Glass in combination round out an altogether fetching decorative scheme. The whole establishment is scrupulously clean and easily kept so.

CARRARA AND BLACK GLASS



Baking in Full View

The modern method of baking in full view of the public is made possible by using ovens with plate glass fronts and Carrara Glass for every surface that comes into contact with the bread itself. The walls and ceiling of Carrara Glass combine to produce the necessary effect of sanitation.



Carrara and Black Glass Signs

This illustration shows an interesting and effective use of these two glasses for store front decoration and advertising. The pattern of the lettering is sandblasted on the highly polished black or white surface and paint or stain is then applied.

from $\frac{1}{2}$ to $1\frac{1}{4}$ inches, with top surface in all finishes and the under surface ground true to provide an even bearing. Table tops are not gauged to exact thickness.

Soda Fountains and Counters. Tops for soda fountains and counters are made in $\frac{1}{2}$ -inch, $\frac{3}{4}$ -inch, 1-inch, and $1\frac{1}{4}$ -inch thicknesses, with the top surface polished and the under surface ground and gauged to an even thickness.

Frieze and Pilasters are made in $\frac{1}{2}$ -inch, $\frac{3}{4}$ -inch, and 1-inch thicknesses, with one side polished and one side ground.

Die Plates are made in $\frac{1}{2}$ -inch, $\frac{3}{4}$ -inch, and 1-inch thicknesses, with one side polished and one ground. In cases where the construction of the counter admits of adjustment for variation in thickness and where none of the edges of the die plates is exposed, it is permissible to specify polished one side, rough one side, for the $\frac{1}{2}$ -inch and $\frac{3}{4}$ -inch thicknesses only. Honed or satin

finish instead of polished also may be specified when desired.

Store Fronts and Signs. Materials for the covering of bulkheads and piers and exposed portions of store fronts may be $\frac{3}{4}$ or 1 inch thick. The areas to be covered do not, as a rule, permit adjustment of the glass and it is usually necessary for the back surface to be ground true and the glass gauged for exact thickness.

Deal-Plates for cashier windows and counters are made in $\frac{3}{4}$ -inch, 1-inch, and $1\frac{1}{4}$ -inch thicknesses. The honed finish is the most practical for this use.

Rubbing Tables for Turkish baths are made in $1\frac{1}{4}$ -inch thickness, in all finishes, and ground on under side.

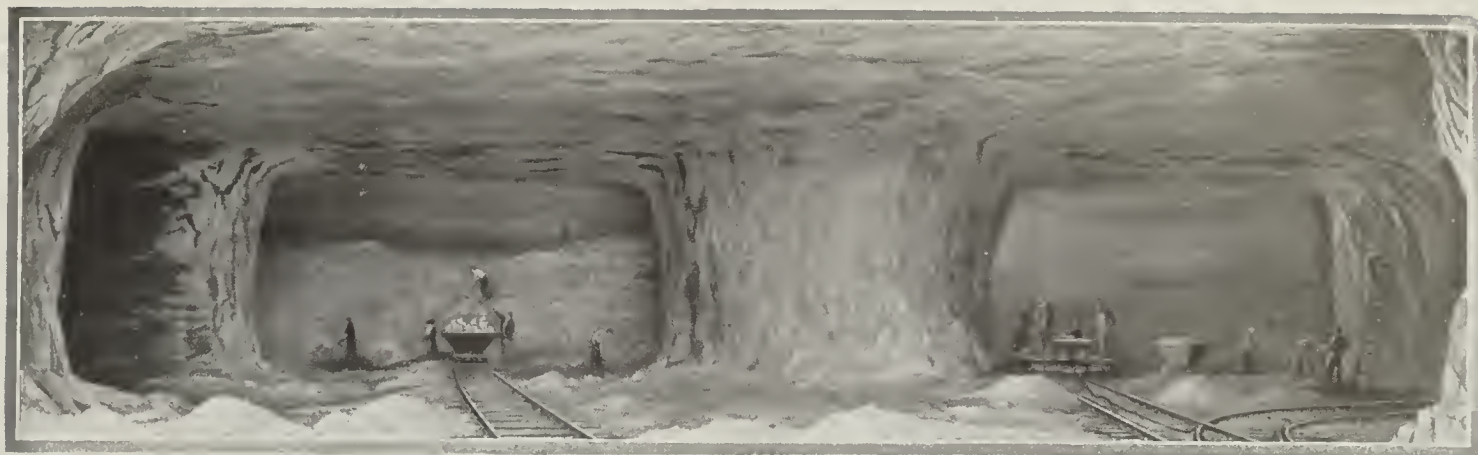
Shelving material is furnished in $\frac{1}{2}$ -inch, $\frac{3}{4}$ -inch, 1-inch, and $1\frac{1}{4}$ -inch thicknesses, with the top surface honed, satin-finished, or polished as desired, the reverse side ground.

THE MANUFACTURE OF
WINDOW GLASS



Like Cathedral Columns

Some manufacturing processes are grimy but here is one that is undeniably beautiful. As the blowing mechanism is drawn slowly upward from the white-hot molten glass, huge cylinders are formed by the pressure of the air blown into them. Later these will be split, flattened out, and cut into panes.



THE MANUFACTURE OF WINDOW GLASS

THE difference between plate glass and the sheet known by the trade term "window glass" lies in the manner of making. Plate glass is cast (poured) in molten mass and then rolled into flat form, while window glass is "blown"—that is, a portion of the melted glass is picked up at the end of a pipe and blown into the form of a hollow cylinder, which then by a succession of operations is flattened into sheets. The latter is an economical method of glass-making and for that reason has a most important place in the industry, although, for the reasons already made clear, it does not produce so excellent a product as does the plate glass method.

There are many ways to attain the best possible results in this method of glass-making, and the Pittsburgh Plate Glass Company has succeeded in improving the product greatly by utilizing to the full all advanced formulas for purity and correct admixture of the raw materials, and by introducing scientific equipment, such as improved furnaces and other appliances.

Glass-blowing is an old art. Through many ages it remained wholly a manual art, or, to be precise, a man-art, since the glass-blower used not only his hands but more especially his lungs. It is a skilled trade of high order, calling for rare dexterity and nice judgment. Even until our own time, it was exclusively such a man-art, for the technical difficulties in the way of mechanical glass-blowing were not easily overcome.

Today, however, while a considerable amount of window glass is still made by hand, most of America's product is blown mechanically.

As the principle is alike in both cases, a description of the manual method will give the reader the clearest understanding.

When the mass in the glass-kiln has reached the correct stage of fluidity, a worker known as the "gatherer" dips into it with his "blower's pipe," an iron tool about five feet long which has a mouthpiece at one end and a bell-shaped aperture at the other. A solid ball of melted glass adheres to the bell-shaped end and when enough has been gathered the pipe is passed to a workman known as the "blower." The floor in front of him is cut away to form a space called the swing-hole. He first raises the pipe, blowing gently till he produces a pear-shaped bubble, the upper part of which gradually assumes the diameter of the cylinder desired, while the bottom is thicker and rapidly cools and stiffens.

The partly blown "gather" then is re-heated to soften it, and the blower swings it downward into the swing-hole, where its weight causes it to elongate into an approximately cylindrical form. Meanwhile he continues to blow into it, to form it as he desires, until finally there is produced a shape of sufficient length.

The next operation is to open the lower end of this hollow cylinder. The blower fills it with air from his lungs and stops the pipe with his thumb. The glass then is submitted quickly to the heat of the furnace, with the result that the imprisoned air expands and bursts through the softened end.

The blower again lowers the cylinder into the swing-hole, whirling it swiftly on its axis by spinning the pipe between his hands. This

PITTSBURGH PLATE GLASS COMPANY



Preparing the "Gather"

In "manual" glass-making, skilled workers prepare the "gather" of molten glass for the blower.

brings centrifugal force to bear, and the glass assumes a true cylindrical form, with sides practically parallel and a fairly uniform thickness throughout its entire length.

The product now has become a smooth, shin-

ing, transparent, hollow thing of glass, but its surface is round. How is it to be transformed into a flat sheet? Simply enough, although to the uninformed spectator the steps of the succeeding operations do not seem to tend that way.



Shaping the "Gather"

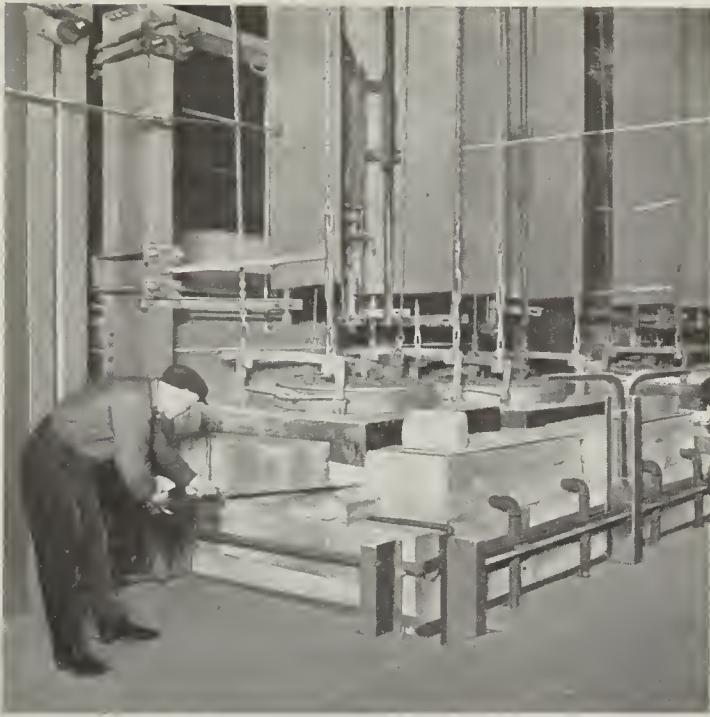
In the "hand-made" process the molten glass is "gathered" on the bell-shaped end of a blower's pipe. By skillful manipulation the blower is able to accumulate a quantity of material which, when blown, will make cylinders of proper size.



Blowing

The blower swings the molten glass on the end of his blowpipe to and fro in a pit or opening in the floor, blowing into the pipe as he swings and reheating the glass at frequent intervals during the process until a full-sized cylinder is formed.

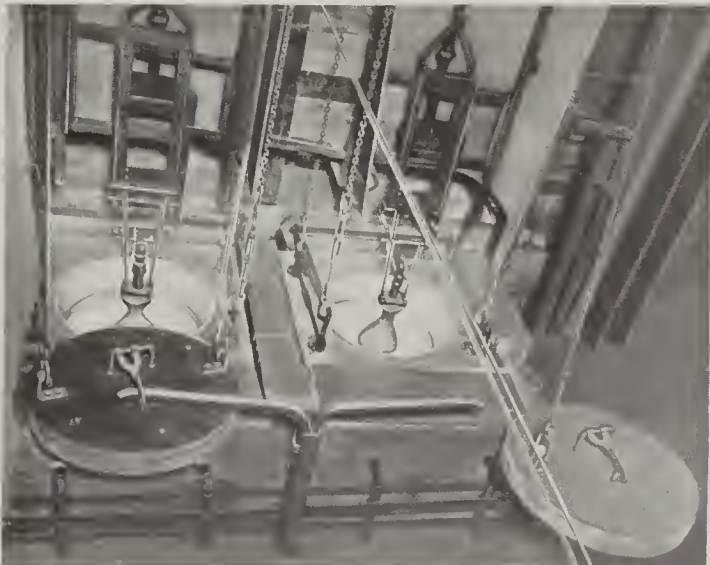
THE MANUFACTURE OF WINDOW GLASS



Skimming the Molten Glass

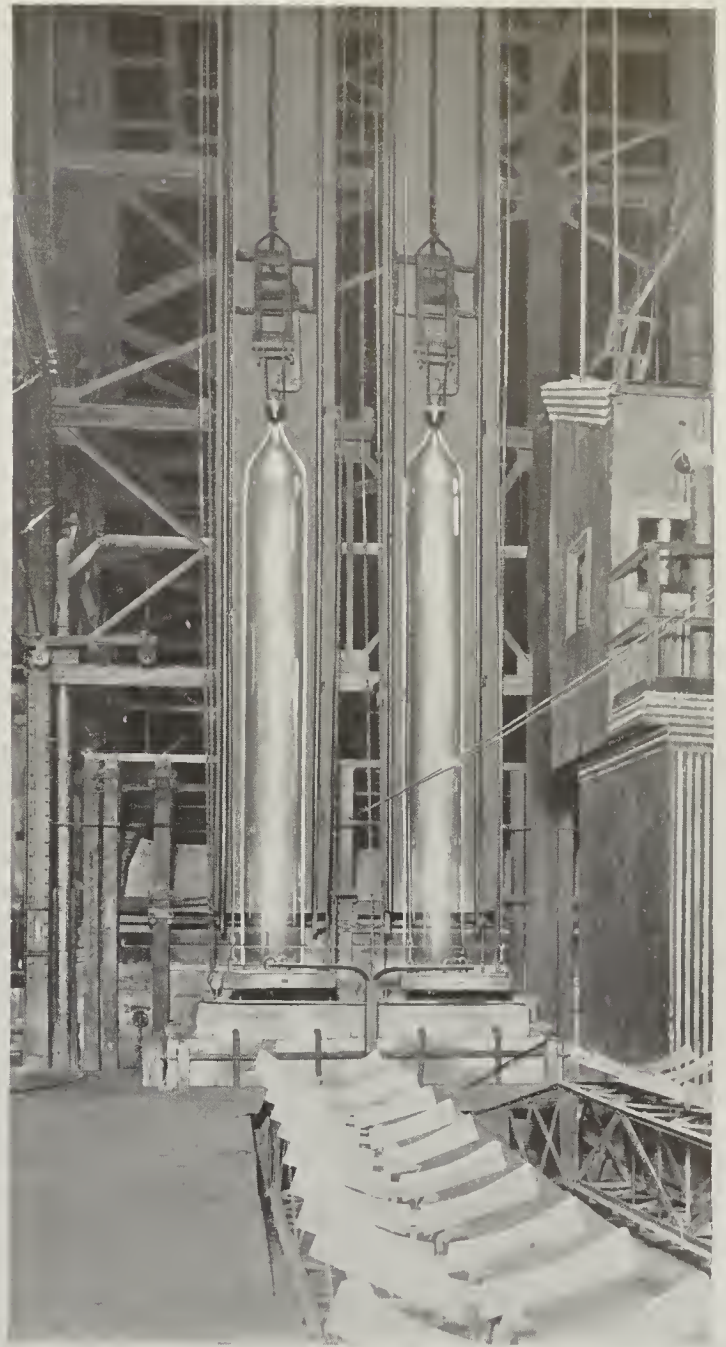
Impurities which come to the top in the process of melting must be removed before blowing.

First the workers must get rid of the neck or cap that marks the place where the glass was held by the blower's pipe. They dip up a bit of molten glass and with a deft motion draw it like a thin hot string around the cylinder top. The neck cracks off, and one part of the task is accomplished. Sometimes the same result is obtained by drawing a red-hot iron around the



The "Bait"

The big blowpipes are dipped into the molten mass as here pictured and then raised gradually, meanwhile blowing steadily into the glass which adheres to their ends. This is the first step in the "machine-made" process.

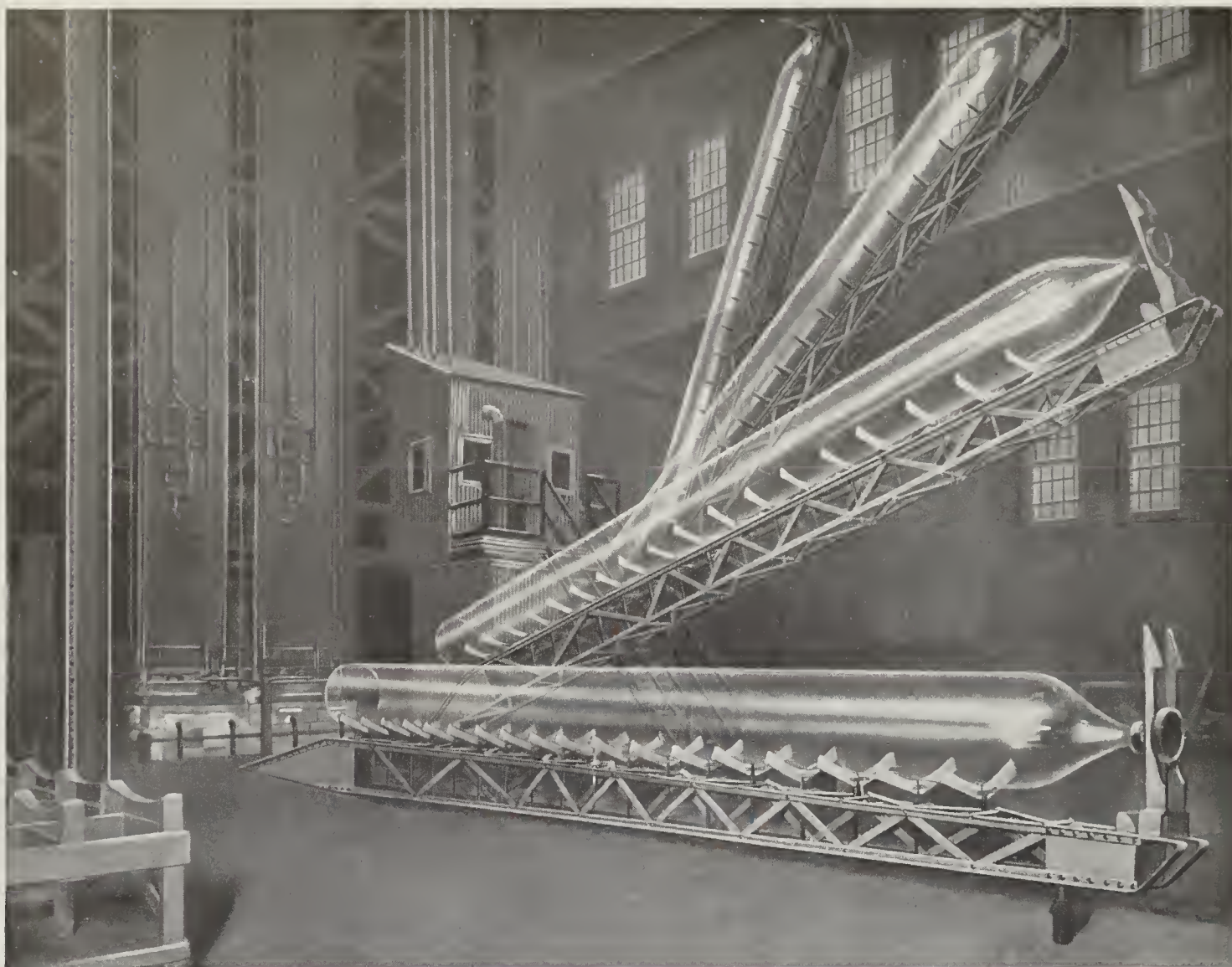


Forming the Cylinders

In this picture the shining cylinders of blown glass have partly emerged from the tanks of fluid batch. When they have reached a length of approximately forty feet the racks shown in the foreground will be raised to receive and lower them as illustrated in the picture on the next page.

glass and quickly applying a touch of cold water to the suddenly heated place. The result in either case is the same—a perfect cylinder, hollow and open at both ends.

In the same way the cylinder is divided into sections, or shawls. Then a worker draws a brightly heated iron along the inside, from end to end, producing a straight line of heat. With a small cold iron rod the outside is tapped following the inner line of heat and the tensions



Lowering the Cylinders

This is the process of lowering the fragile cylinders of glass after blowing.

of the mass cause it to split clean along the entire length of the cylinder.

The cylinder then is conveyed to a flattening oven, heated until soft and pliable, and laid on a flattening stone, with the split side uppermost. Under continuing heat the glass softens still more and begins slowly, gracefully, to "wilt" or open out. A workman called the "flattener" delicately assists with an implement that gradually spreads the pliable glass into a flat sheet.

Following this, the sheet is taken from the heat of the flattening compartment and allowed to cool and harden slowly, after which it goes through the successive stages of scientific cooling in the lehr or annealing kiln. After being properly tempered, it is dipped in acid to cleanse it and finally is passed to the warehouse to be cut into the sizes required by the trade.

Up to this point the modern individual glass-blower goes through processes that are not unlike those pictured in the wall-paintings of the ancient Egyptian tombs. Indeed, it is probable that if an old workman who lived and produced along the banks of the Nile in the time of Pharaoh Rameses II were to find himself in a modern factory using the process just described he would feel strangely at home. However, human ambition never is content to stop short of mechanical efficiency, and if our ancient Egyptian were next to step into a plant where machine-blowing was in practice he would doubtless be overwhelmed with terrified wonder.

He would see a spectacle as amazing and beautiful as, perhaps, any other in the entire field of industry—one that thrills the most sophisticated modern observer who happens upon it

THE MANUFACTURE OF WINDOW GLASS



The Shawls

Here we see a quantity of shawls, which is the technical name for the sections of glass cylinders after they have been divided into lengths and split lengthwise. These sections, or shawls, are now ready for reheating and flattening.

for the first time. Some hint of its spectacular impressiveness may be gained from the full-page picture facing page 173, but anyone who has an opportunity to see for himself should by no means neglect to do so.

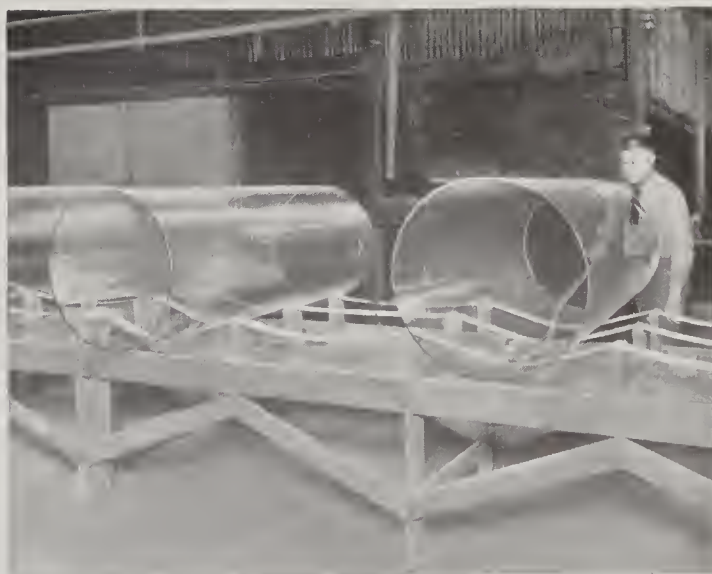
The evolution of machine-blowing came only as the result of laborious invention and costly

experiment. As has been remarked, the principle is simple, but the technical and mechanical difficulties long were baffling. The glass-blower always has been recognized as one of the highly skilled craftsmen, and for a long time it was impossible to devise machinery to match his intelligent judgment. The glass-blowing plant of the



Dividing the Cylinders

By means of red-hot metal applied to the glass, the cylinder is divided into sections of various lengths as a preliminary to the processes of shawling and flattening.



Shawling

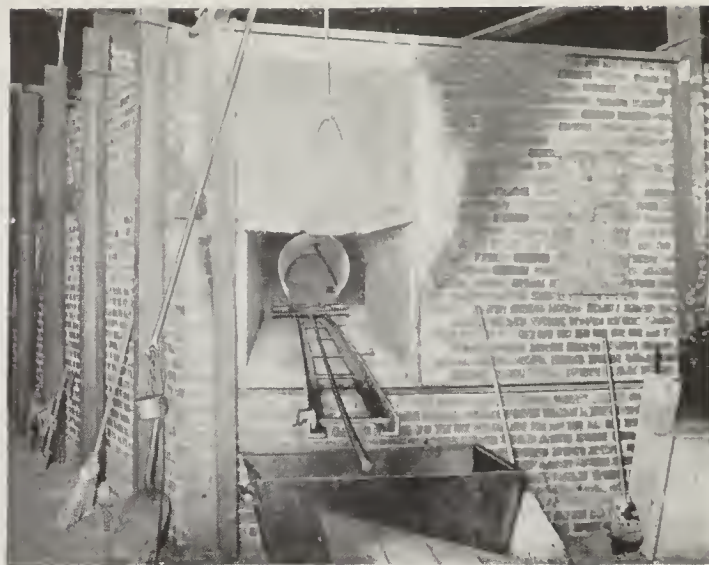
After the cylinder is cut in lengths these sections are split lengthwise preparatory to reheating and flattening them into sheets. This operation is known as shawling.

PITTSBURGH PLATE GLASS COMPANY



The Heating Oven

Here the split section or shawl is reheated and softened until it loses its cylindrical shape and becomes flat. Facilities for the application of intense heat are essential.



Turning the Cylinder

While in the heating oven the shawl is gradually turned so as to permit it to flatten out as the glass softens or wilts under the heat. It is then removed to a flattening oven.

present, however, is a marvel of smooth, unhurried industrial operation. All the puzzling and constantly changing problems of air pressure, varying supply of molten material, and manipulation according to circumstances and conditions are met by a machine controlled by the judgment of one man, who with no apparent effort achieves prodigies of result.

Invention is largely a means for multiplying human powers. Our telephone ears are able to hear for thousands of miles and our telescope eyes can explore the stars. We leap thousands

of feet into the air with airplanes and with cannon we strike blows miles away. In almost any modern factory the workmen have become in effect giants, by virtue of the forces they control with a finger-touch.

In the process under discussion human lungs are displaced by compressed air apparatus that is able to blow strongly and without stopping, until the lump of melted glass swells to towering proportions. Meanwhile, the lifting power of human arms gives way to a pulley hoist that raises the great cylinders to a point



Flattening Oven

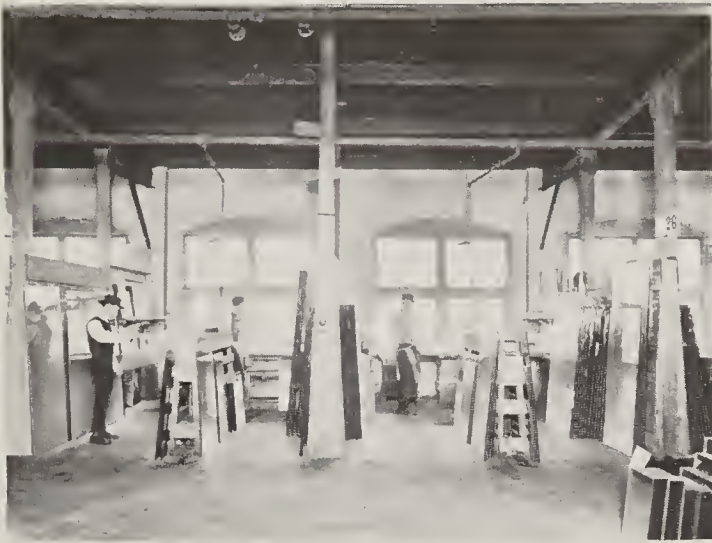
When the glass is sufficiently flattened out it is lifted from the iron carriage in the heating oven, transferred to a flattening stone of fire clay, and then ironed into a flat sheet.



Lifting to Lehr

From the flattening compartment the sheet of glass is moved to a cooler one and then to the lehr, or annealing oven, where it is allowed to cool and temper by degrees.

THE MANUFACTURE OF WINDOW GLASS



Cutting Room

Here the window glass is cut into various sizes and shapes ready for use.



Packing Room

Where expert packers daily prepare thousands of "lights" for shipment.

many times the height of a man. All is done swiftly and yet with such delicacy that the fragile glass remains uncracked. The machine does almost exactly what the human glass-worker did, only upon a colossal scale. It dips its big blowpipes into the molten batch and then slowly withdraws them, all the while blowing steadily into the great masses of glass. Then

suddenly there rise before the spectator beautiful tall phantoms of transparency, mighty glowing columns that stand like pillars in a ghostly cathedral. As against the man-made cylinder, which obviously was limited to the weight and dimensions a man's strength and stature permitted, machine-blown cylinders can be made almost forty feet long and more than two feet in diameter.



Ready for Shipment

PITTSBURGH PLATE GLASS COMPANY



The Modern Factory

Sunlight is of vital importance in the modern industrial plant. Where an essential requirement is to admit light, considerations of clear vision and beauty being unimportant, window glass is as serviceable as plate glass and costs less.



The Summer Dancing Pavilion

For the purpose here illustrated, window glass serves every requirement. The walls of glass are usually a series of windows that can be flung wide, so that the building may be easily converted into an open-air pavilion.

MANIFOLD VALUES OF WINDOW GLASS



The Summer Kitchen

Here is another example of an ideal use for window glass—where it is used principally to admit light and not to look through.

MANIFOLD VALUES OF WINDOW GLASS

TO USE common glass where plate glass should be employed is a short-sighted saving of pennies at the cost of dollars, but it is excellent economy to use window glass in its proper place, and so wide is its field that this form of glass serves a most important purpose.

The usefulness of window glass extends away beyond domestic purposes, to almost every industry, large and small. It is window glass that provides thousands of acres of vegetable farms with the very means for their existence, in the form of glazing for the hotbeds and coldframes which enable the grower to anticipate the seasons. It furnishes photographic art with its indispensable plates. Cellar windows, storm doors and windows, kitchen additions, attic windows, and other little-noticed parts of the dwelling will be entirely serviceable when glazed with common glass, while the rest of the house makes use of the more desirable and handsome plate.

Merely as an indication of the almost boundless field for common glass may be mentioned the

following few uses that confront one everywhere in daily life:

Skylights, where fire protection, security, and beauty are not essential.

Fronts for gas and electric meters, for fire alarm boxes, and for the cases on ships and railroads that contain life preservers, axes, and other implements for use in accident.

Conservatories, hothouses, greenhouses, and sash for outdoor plantations.

Tops for fancy boxes.

Glazing for photographs and pictures.

Cheap mirrors, either for reflecting the person or for backs to fancy receptacles.

Fronts or tops for receptacles containing foods.

On machinery, either to protect delicate working parts, prevent accident, or permit control by making the necessary parts visible.

Coin boxes, automatic devices of all kinds, and ticket chopping boxes.

Glazing for stables, barns, and other out-buildings.



How Glass Aids the Plant-Grower

Greenhouses and coldframes as pictured on this page require merely the transmission of sunlight and protection from cold. For this purpose window glass is perfectly adapted and is largely employed.

GRADES, WEIGHTS, AND SIZES OF WINDOW GLASS

Window glass usually is supplied in *Single Strength* or *Double Strength*. In double strength it is made as large as 30 x 90, 38 x 86, or 60 x 70 inches. Such extreme sizes contain up to twenty-five square feet, but it is not advisable to use glass so large, because of breakage and other disadvantages. The same is true of the single

strength, which can be made up to 24 x 60, 30 x 54, or 36 x 50 inches, in sizes containing ten to twelve and one-half square feet.

THICKNESS AND WEIGHT

Single Strength measures twelve lights to the inch, approximately, but a small variation either



Coldframes



Protected by Glass

MANIFOLD VALUES OF WINDOW GLASS



Glass for Pictures

In the novelty section of the big department store there may be found thousands of articles in which common or cylinder glass is used. Such glass can be cut to any size or shape for unique and novel picture frames.

way is permitted. The weight per square foot is approximately eighteen ounces.

Double Strength measures approximately nine lights to the inch. The weight approximates twenty-four ounces to the square foot.

There is also a heavy blown or drawn glass, heavier than the so-called *Double Strength*, made by the same process as ordinary window glass and subject to the same inherent defects. This glass is graded in first, second, and third qualities by the same rules as are observed in the grading of common window glass and is made in different weights and thicknesses as follows: twenty-six ounces to the square foot, about eight lights to the inch; twenty-nine ounces to the square foot, about seven lights to the inch; thirty-four ounces to the square foot, about six lights to the inch; and thirty-nine ounces to the square foot, which is three-sixteenths of an inch thick, or about five lights to the inch.

QUALITIES OR GRADES

Qualities run AA, A, and B.

"AA" or first quality is clear glass, free from any perceptible quantity of air bubbles or blisters, burnt specks or burns, cords, and strings.

It has good gloss, even surface, and is well flattened. Tiny blisters that are not perceptible on the cutter's table, but can be detected only by placing the sheet directly toward the light, are not considered objectionable. Reliable manufacturers always will make conscientious and close selection for this grade.

"A" quality is the normal selection of glass when no special selection is desired. It permits



Window Glass in Steel Sash

PITTSBURGH PLATE GLASS COMPANY



Tea Wagon



Studio Skylight

small defects such as small strings or lines or small blisters not too close together or located in the center of the sheet. It is well flattened, of even surface, and devoid of noticeable scratches or other prominent imperfections.

"B" quality has a wider scope than AA or A. It permits many of the defects incident to manufacture—waves, strings, lines, blisters, scratches, burns, and like defects. This quality embraces everything below A quality, not stony or full of

blisters or other large defects objectionable for any common purpose, such as heavy scratches, heavy blisters, cords, and sulphur stains.

FACTORY PACKAGES

Window glass is packed in regular sizes approximately fifty square feet to the box up to the united 100-inch bracket (adding width and length); and 100 square feet to the box in sizes over 100 united inches.

COLORED CYLINDER GLASS

Pot Colors. This colored glass, produced by mixing the necessary color-making chemicals in the pot with the molten batch, is extremely useful for signal lights, danger signals, colored lanterns, show-window displays, dials, railroad switch lights, and countless commercial and in-

dustrial purposes where both translucency and color are desired. The color, being an insoluble part of the glass, defies time and weather.

Double Strength and *Single Strength* ruby, green, blue, orange, violet, yellow, and white are produced, in sizes as large as 37 x 59 inches.

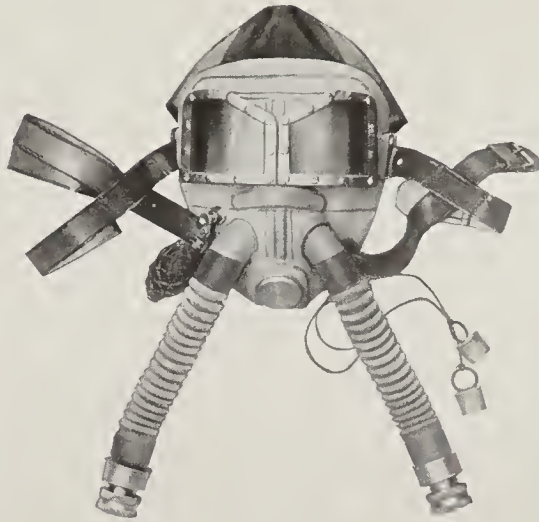


Game Exhibition Case



For Small Package Goods

MANIFOLD VALUES OF WINDOW GLASS



Other Miscellaneous Uses

In the various cases indicated on this page the expense of using plate glass hardly would be warranted, while common glass meets every essential requirement.

Flashed Colors. These colors are, like the pot colors, a component part of the mass of the glass, but they are produced by a different method. A thin film of colored glass is blown over the surface of a blown clear glass, the two adhering and becoming one as they harden. It is a convenient and effective way to make color designs, such as embossed lettering in signs. It is made in *Double Strength* and *Single Strength* and comes in the same sizes and colors as the *Pot Colors*.

SHIPPING WEIGHTS

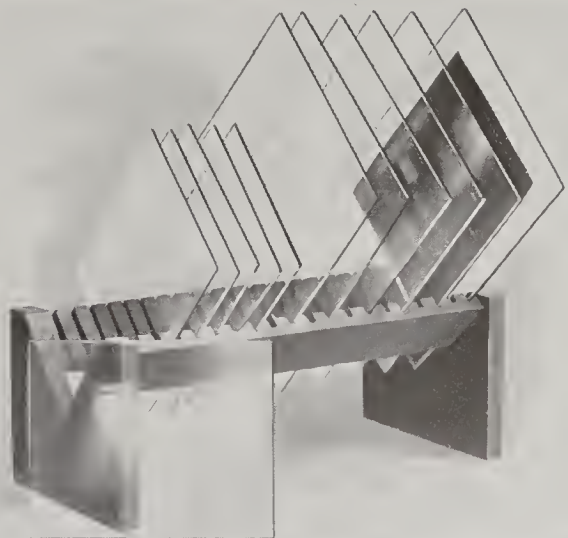
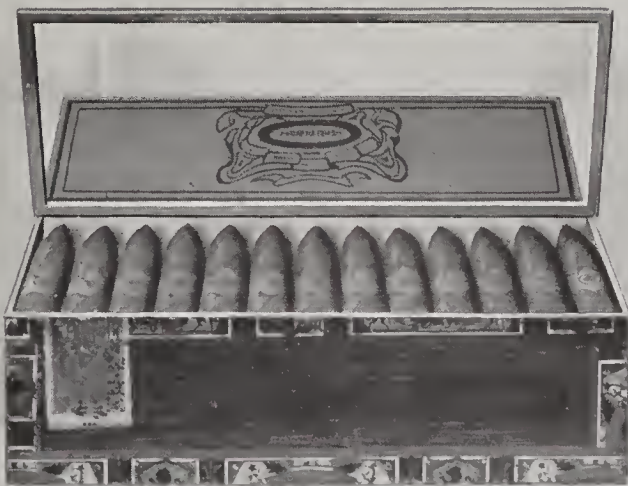
Single Strength in factory packages weighs from sixty-five to seventy-five pounds to the box (shipping weight). *Double Strength* in factory

packages weighs from eighty-five to one hundred and ten pounds to the box, 50-foot boxes (shipping weight).

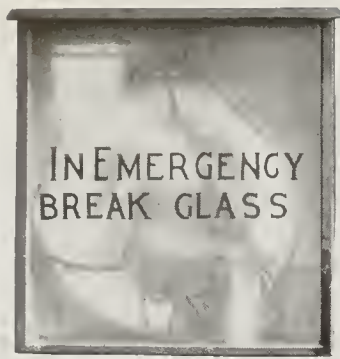
Double Strength in 100-foot cases weighs approximately two hundred and twenty-five pounds (shipping weight).

PRICES

Full information regarding list prices of all qualities and sizes of window glass in both single and double strength, in factory box lot, or by the light, may be found in the current "Jobbers' Window Glass List," which may be obtained from any of our Warehouses or distributors. The list also designates the number of lights per box in each size.

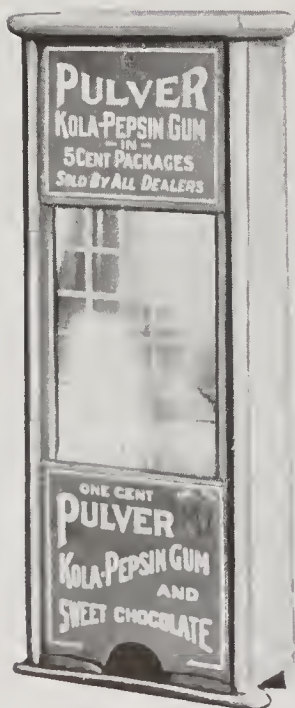


PITTSBURGH PLATE GLASS COMPANY



Miscellaneous Uses of Common Glass

This page shows a number of uses in which common glass is entirely adequate, and much more economical for the purpose than plate glass would be.



THE PITTSBURGH PLATE GLASS COMPANY SYSTEM OF DISTRIBUTION, EDUCATION, AND SERVICE

WHEN the Pittsburgh Plate Glass Company had succeeded in establishing plate glass manufacture as a sound American industry, able to meet all competition both in quality and in cost, there remained a grave business problem in the matter of distribution.

Glass, one of the most difficult materials to transport and handle, is needed in such a large variety of kinds, sizes, and shapes, and must be supplied so promptly in order to meet the pressing necessities of the builder and contractor, that it was necessary to furnish all dealers with a means for performing the service with the utmost economy of time, money, and effort.

There could be but one solution—the establishment of a nation-wide method of distribution through a complete warehousing system which should be equipped to carry full stocks and to deliver them promptly, wherever needed and in any desired quantity.

Today this system is the most complete of its kind in the world. The Warehouses are not simply stock rooms or selling agencies; they are local institutions equipped to serve in all ways the territories in which they are established. Their managers are men long trained in the methods and principles of the Company, thoroughly informed by personal experience on all points of glass manufacture and glass science, and competent to give full information and instruction on matters the most technical.

EDUCATIONAL SERVICE

The sales force in each territory is similarly equipped with exact knowledge. In addition the staff includes specialists in various branches, particularly the structural sciences, and workmen who are skilled in handling and setting glass. Educational service is given freely wherever it may be of benefit to the community, to dealers or even to individual users. National advertising is continuous, and its governing principle is that of helping the dealer, the architect, and the contractor—in a word, everyone in the trades who uses glass as a large or small part of

his business. Further, the Company's advertising benefits the public by teaching the genuine advantages to be obtained by using glass.

Terms like "welfare work" have been so much used in recent years, that the Pittsburgh Plate Glass Company would prefer not to touch in this book on the subject of its attitude toward its employees save that the consumer of any manufactured material has a direct business interest in the conditions under which it is produced. The assurance of steady and prompt supply, and more important still, of the quality of the product, depends in a very real sense on the spirit of the workers responsible for it.

THE COMPANY'S EMPLOYEES

No degree of genius in administration, no system or equipment, can alone attain and maintain quality. It is essential that the men directly engaged in every part of a manufacturing process shall be interested in their work and shall take personal pride in the best results that can be produced. From this point of view it will be of interest to customers to know that a great many of the Company's trained workers have been with it during the whole working period of their lives and that the labor "turn-over" is perhaps smaller than that of any other great manufacturing business in the United States.

The significance of this may be seen when it is understood that in Ford City, Pennsylvania (the site of the parent plant of the Pittsburgh Plate Glass Company), practically the entire working population of the town is employed in the plant. Two things are commonly said about Ford City: that it holds the largest and most completely equipped factory for making plate glass in the world, and that it is one of the most attractive manufacturing communities in the United States. The Company's expenditures for housing facilities amount to many millions. Life, health, and accident insurance, a pension system, provisions for recreation, hospital facilities, and other care for health and hygiene, all play their part in making the place what it is.

PITTSBURGH PLATE GLASS COMPANY

A SYSTEMATIC ORGANIZATION FOR GENUINE SERVICE

“SERVICE,” as understood by the Pittsburgh Plate Glass Company, has the following comprehensive significance:

Systematic and harmoniously directed activities of manufacturing, distributing, and warehousing and selling organizations, all controlled by the ruling principle that customers of the Pittsburgh Plate Glass Company are to receive something more than what is ordinarily meant by “service.”

Raw materials economically produced, mostly from Company-owned properties, and economically delivered to wisely located plants, making possible a basic saving that benefits both the dealer and the consumer of the glass product.

Direct and constant contact of manufacturing organizations with the market through the distributing Warehouses and sales offices, producing quick adjustment of production to meet conditions at all times and under all circumstances.

The organization and equipment of each Warehouse to be not simply a distributing and selling station, but a commercial member of the region it serves, an institution of use to the community, and a co-operative force for all in the business.

NOTE: It is a recognized and important part of Warehouse service to supply technical and trade information to architects, contractors, and dealers, and to help the latter to take the best advantage of the Company's national advertising, trademark advertising, and other educational publicity, and to direct its usefulness to earning the fullest possible profit for the entire trade.

SERVICE TO DEALERS

Complete stocks, at all times and under all conditions, in each Warehouse, thus ensuring prompt and economical delivery.

Readiness to fill any order, whether of great magnitude or for a single light of glass.

Distributing facilities that cut down all non-productive expenditures to the minimum, making it feasible to deliver a maximum of quality at a minimum of price.

An organization of trained men who study the promotion of business for the dealer and visit him regularly to assist him in problems and supply information tending to his profit.

An energetic national and local campaign to educate the public to an increased use of glass on the sound and legitimate basis of facts that show its value for all purposes.

A long-established manufacturing policy that recognizes quality as a supreme factor in holding and creating business, thus enabling the dealer to earn prestige among his own trade.

Systematic study of possibilities for the future, and measures taken in advance to meet them, thus giving the dealer the assurance that behind him stands a permanently attentive producing and delivering organization.

SERVICE TO ARCHITECTS

Experienced men in each Warehouse organization who can furnish information about glass to cover every problem that is likely to arise in the application of glass to buildings.

Unprejudiced and absolutely reliable advice regarding glass specifications necessary to get desired results.

Estimates of cost for all different kinds of glass, with a view to enabling the architect to save money, while equipping his building with the best glass for each specific purpose and place.

Expert attention to the specifications and production of the quality called for, thus relieving architects of anxiety and trouble after contracts are awarded.

Maintenance of distribution facilities between factories and Warehouses, and maintenance of sufficient stocks in Warehouses to make quick delivery certain.

Manufacturing resources that are equal to any requirements.

Equipment and organization adequate to meet all demands and to cope promptly with unusual and sudden problems or emergencies.

Alert and interested attention to all undertakings, whether small or large.

SERVICE TO CONTRACTORS

An organization in each Warehouse that fully understands the unexpected and harassing difficulties that confront contractors, and is ready to assist at all times.

Full stocks of complete variety, covering every kind of glass for every possible purpose.

Thorough efficiency both in manufacture and grading, thus providing responsible delivery to meet specifications in all cases.

DISTRIBUTION, EDUCATION, AND SERVICE



Service on a Large Scale

Here is a solid train of 23 cars of plate glass valued at \$400,000 as it left the Pittsburgh Plate Glass Company's factory at Crystal City, Missouri, at a time of great freight congestion on the railroads. Small shippers could not give service under these conditions but this Company was able to accumulate entire trainloads of orders which could be shipped as a unit to one destination.

Delivery facilities at each Warehouse to meet a "rush" summons at almost any time.

Co-operation by all the factory staffs and the technical departments in efforts to give customers what they want, when they want it, and as they should have it for their best profit and success.

ADVANCE INFORMATION

If architects or contractors will call for this expert advice early in their work, they frequently will save themselves much unnecessary delay, for the Pittsburgh Plate Glass Company men will be able to show how many contingencies can be anticipated. They may be able, as they often are, to suggest important economies.

There are so many kinds of glass, known by so many trade names, that sometimes a builder who knows quite well what kind of glass he wants is not sure as to its precise trade name. It happens continually that architects and contractors are indefinite in their use of such terms as "rolled

figured glass," "figured glass," "obscure glass." It is hoped that this book will facilitate their efforts, but in addition, the service staffs are prepared at any time to suggest the particular kind of glass suitable for any desired purpose.

OTHER SERVICE FEATURES

Estimating Department is maintained at each Warehouse to give detailed and accurate cost estimates for any use of glass.

Expert Advice. Staff mechanics and specialists are available at the various branches and factories and are prepared to give expert assistance to manufacturers, architects, dealers, and others in all problems involving the use of glass.

Installation of Store Fronts. The Warehouses are prepared to install large store fronts, and furnish trained workers. Motor trucks and teams are provided for the purpose and either long-distance or short-distance hauls will be undertaken.

PAINTS AND VARNISHES AS PART OF PITTSBURGH SERVICE

IT IS not out of place here to say a word as to the Warehouse stocks of paints and varnishes, since these accessories of the building trade were added to the Pittsburgh Plate Glass Company's

group of manufactured and sales products as part of the system of "Pittsburgh Service."

The architect or contractor thus can get from the same trained organization that provides his

PITTSBURGH PLATE GLASS COMPANY

glass specifications and information, the best technical information and specifications as to useful paints and varnishes.

The paint dealer especially, knowing how vital it is for him to be assured of unbroken maintenance of supply and of constantly uniform and reliable quality and grade, has been benefited by the fact that such a permanent organization as the Pittsburgh Plate Glass Company serves him. Too many dealers throughout the United

States have been obliged, again and again, to change brands at heavy loss of prestige and profit, because their manufacturing source has failed, either by going out of business, by altering product, or by selling out to some concern that gave exclusive rights to some competitor in the neighborhood.

It is difficult to conceive of any product in which the element of sustained quality is of more importance than it is in paint.

THE GRADING OF PLATE GLASS

THE various uses of plate glass require a careful grading of the finished product into different qualities. The highest possible quality is known as "first silvering"; "second silvering" is a high-grade quality only less perfect than the first-named. Both of these grades are used for mirrors and are produced by selecting limited areas of superior quality and finish from the larger sheets that are delivered to the wareroom from the factory. A third grade of reasonably good quality and finish, known as "mirror glazing," is selected for the manufacture of "commercial quality" mirrors. Much greater in volume of sales is the next, or "glazing" quality. This grade generally is used for store windows, residences, windshields, enclosed automobile bodies, and other places where comparatively small and inconspicuous defects are not objectionable.

It is the impression among many people that the better qualities of glass are manufactured by a special process and that by some slight change in the method of operation these better qualities may be increased or decreased at will. This is not the case. It is impractical to attempt to manufacture the higher grades exclusively, and it is the experience of manufacturers that the best results are obtained by making every effort to secure the highest possible standard of quality in the entire product.

PRINCIPLES OF GRADING

Unfortunately, however, all glass is defective to a greater or less extent, a perfect light of any appreciable area never having been produced. The better grades, therefore, are merely the result of selection and are definitely limited by the success or failure of the general operations of the

plant. The volume of the higher grades never exceeds twenty per cent of the total production and the normal production of these grades is generally from five per cent to ten per cent.

Frequently, difficulties in some one of the many operations in the plant prevent the production of any quality better than "glazing." It will be understood, therefore, that the higher prices asked for "first" and "second" silvering qualities represent not so much the extra cost of production as the cost of selection after the glass is made. This cost includes the loss in value of the residual small glass of lower value, which is necessarily left after the areas of the higher grades are cut from the original large plates.

It is not practical to set forth specifically the standards by which any of the grades are judged or selected. No two plates in any standard are absolutely identical in every respect and the selection is based upon the number, size, location, and importance of any or all its major defects. As the entire product is defective to some degree, the selection even of the higher grades consists in choosing those areas of glass which are clear of major defects and in which the minor defects are small and well scattered. No set rule can be made for this selection; it is entirely a question of judgment and of experience.

For this reason it is impracticable to attempt to meet any arbitrary specifications of quality or grade demanded by a customer. He must, after inspection of standard grades, determine which will best suit his requirements, leaving to the factory the faithful maintenance of the standard.

CONDITIONS THAT GOVERN

Inasmuch as the entire product is, by its nature, defective, and as the better grades are

THE PACKING OF PLATE GLASS

merely the result of selection, it should be noted that the size of the required plate has a large bearing upon the standard. Defects which would cause a small plate of five square feet area to be graded as "glazing" quality would be permissible in a selected "silvering" quality plate of say twenty-five square feet area. In all plates of selected quality major defects are eliminated, but the larger plates will contain more numerous and more prominent defects than smaller plates of equal grade.

The most common defects found in plate glass are "seed," "boil," and "bubbles"; "striæ," "ream," or "string"; and fine scratches resulting from the grinding and polishing operations. "Seed," "boil," and "bubbles" are all alike in character but different in size. "Seed" are extremely small air or gas vesicles, while "boil" are somewhat larger, being best illustrated by the general factory name "pin-head boil." "Bubbles" are air pockets still larger than "boil," generally running about three-sixteenths of an inch in diameter. "Bubbles" are generally the result of defective casting, but both "seed" and "boil" are produced in the furnace during the melting process.

As indicated elsewhere, about thirty per cent of the batch is volatilized, and this volatilization continues as long as the batch is held under melting temperatures. During this period the whole body of glass contains innumerable gas bubbles, but the greater part of them, especially the larger ones, rise to the surface and escape. Some, however, are left in the glass. The very nature of the process, therefore, makes it impossible to produce plate glass that does not contain some evidence of volatilization in the form of "seed" or "boil."

"Striæ," "ream," or "string," as variously known, generally may be found in some degree. This defect is the result of incomplete fusion of the constituent parts of the batch. It is not noticeably objectionable except when heavy or coarse, and then only in the selected grades.

A scratch on the surface is one of the most common defects found in plate glass. It may be caused by coarse grains of sand or emery becoming mixed with the finer grades, by small pieces of glass chipped from the edges during the grinding and polishing, or by a little carelessness in handling. Long and deep scratches are eliminated even in glazing quality, but shorter and less conspicuous scratches are permissible defects. During the polishing process it is impossible to avoid making what are known as "hair-line sleeks," or very fine scratches which can be seen only under very favorable light conditions. These are superficial and are permissible even in the higher grades.

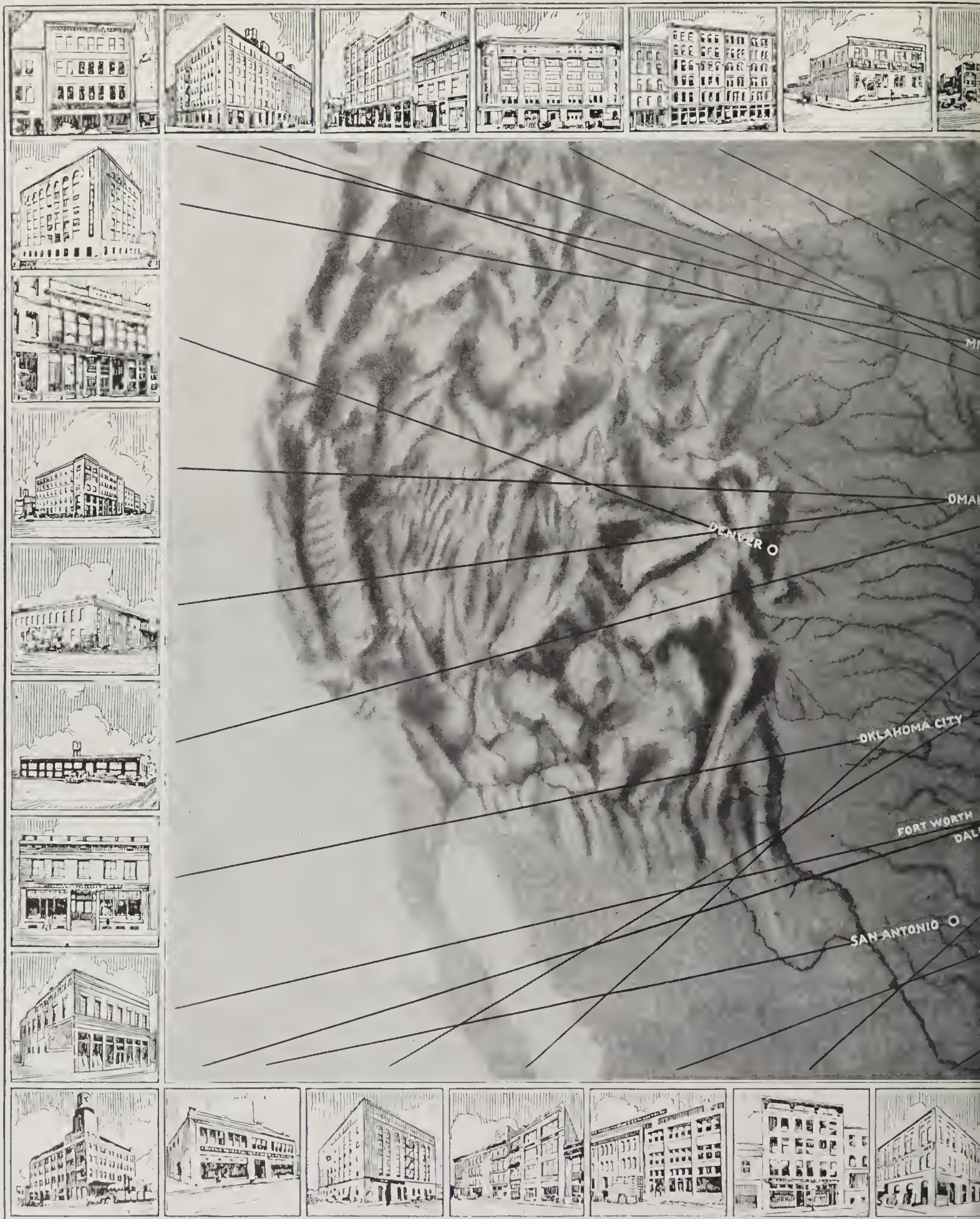
The basic idea in selecting any grade of glass is to eliminate those defects which would make it objectionable for the destined purpose. It should be remembered that glass differs from all other merchandise in the respect that we look *through* it and not *at* it. The eyes are invariably focused on the object beyond and do not detect even those defects that are conspicuous when the plate is examined critically. Thus, in a grade that is not to be silvered, noticeable defects are permissible when they do not offend or obstruct the vision *through* the glass to the object. Similarly even in the higher grades which are used for mirrors, defects that might readily be detected by critical examination would pass the inspection if they are not such as would be noticed when one looks at an object in the mirror.

THE PACKING OF PLATE GLASS

WHEN the finished glass is shipped it must be packed with the utmost care in order to prevent breakage and other damage in transit. The Pittsburgh Plate Glass Company maintains a distinctive system of packing and an organization especially trained and competent from long experience. The guiding principle is that even though the Company is not responsible for carelessness by transportation lines and others who handle the glass after it leaves its jurisdiction every effort shall be made in packing and ship-

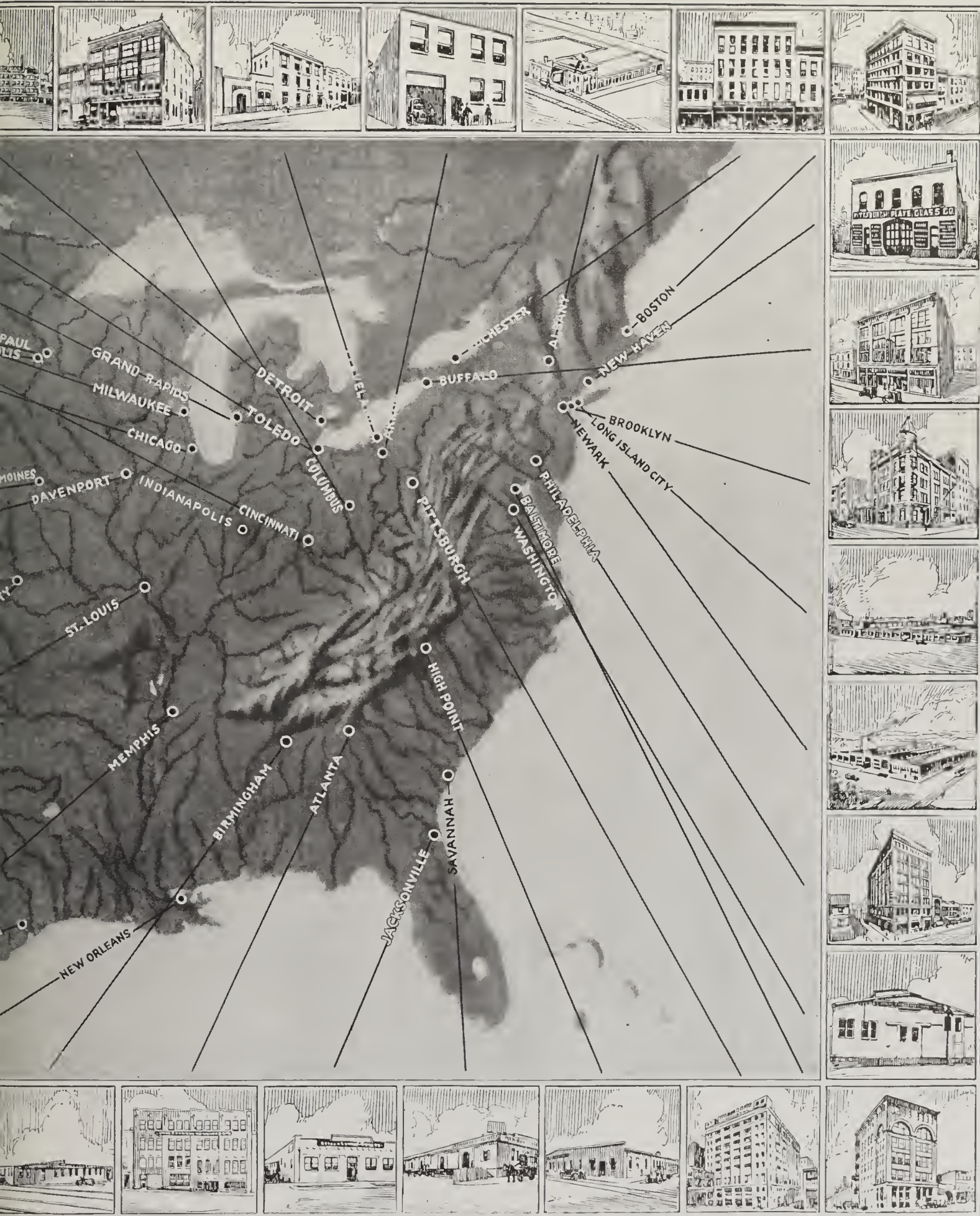
ment to provide safeguards that shall insure good delivery to the customer.

First, a stout wooden box or case is provided. It is about seven inches larger in width and length than the width and length of the largest plate it is to contain, and of the necessary depth to hold about 600 square feet of glass. The case is laid flat and a thick bed of straw is first laid on the bottom. This in turn is covered with a sheet of heavy paper, on which is laid the first plate of glass. That is covered with a sheet of



Warehouse System of the

This presentation of the unequalled system for distribution and service shows
 thousands of dealers for use in hundreds of thousands of buildings. T



Pittsburgh Plate Glass Company

fully the extent of the organization required to supply this Company's products to
 tion and addresses of the various Warehouses will be found on page 208.

PITTSBURGH PLATE GLASS COMPANY

clean paper, on which the next plate is placed. The packing is continued thus, a plate of glass and a sheet of paper alternating, until the case is full within about an inch and a half of the top.

The pile of glass plates, being smaller than the case, leaves a clear space of about one and one-half inches between the edges and the case, extending around all four sides and the full depth of the case. This space is stuffed with straw forced in to the utmost, forming a compact but resilient cushion all round the glass. A thick bed of straw is then laid over the entire surface of the glass; this is compressed tightly when the lid of the case is nailed into place, thus making a tightly compressed cushion of straw enclosing the glass on all sides. The case is then turned up on edge and loaded with other cases on the railroad car for transportation to destination.

The glass rides on its edges; and as the many plates in a case are packed and held together like a solid block, they present remarkable strength to withstand the blows and shocks unavoidably sustained during transit.

The actual amount of breakage is extremely small as compared with the total amount shipped. According to records covering the shipment of 2300 carloads of plate glass, the claims filed for loss in transit amounted to less than \$2,000, or an average of less than one dollar per carload.

EXPORT SHIPMENT

During and since the World War, owing to the cessation of plate glass manufacture in European countries, there has arisen a heavy demand for plate glass in this country for export to meet the world's requirements. Before this, the exports of glass from America had been negligible, and generally limited to such neighboring countries as Canada and Mexico. But since 1915-16 large quantities have gone from America all over the world, and naturally, as to the largest manufacturer, the bulk of this business has come to the Pittsburgh Plate Glass Company.

Export shipments require extremely strong packing cases, specially constructed to withstand the frequent handling and the hazards of transportation by rail and by ocean steamship. To meet these requirements, the Company devised and built an ideal packing case for export shipments, of extremely strong construction, braced with steel plates on the corners and bolted to-

gether with specially devised steel bolts, instead of nails. Many cases contain up to 1000 square feet of glass and weigh considerably over two tons each when packed. These have traveled to almost every civilized country on the globe, and their excellence has brought many letters of commendation.

HANDLING PLATE GLASS

The surface of polished plate glass can be damaged or scratched by careless or unintelligent handling. In this respect, it resembles the surface of a fine lens, and should be as carefully treated. The sheets of paper used by the manufacturer in packing to protect the surfaces should be kept in place when the glass is unpacked and should not be removed until the glass is finally set in place or used.

Plate glass never should be piled up on the flat surfaces, but should be piled on the edges with a sheet of paper between each two plates, as when received.

No dust or grit should be allowed at any time to settle or accumulate upon piles of glass, as it will work down between the plates and damage the surfaces.

When plates are removed from piles of glass, handle one at a time and, in doing so, lift the plate clear away from the other glass; never drag or slide a plate over the glass remaining in the pile.

Glass should not be laid flat upon a table or box that is not covered with clean cloth or other clean, soft material.

When cases of glass are received, it is best to unpack them as soon as possible, especially if the glass is to be stored for some time before being used. If it is necessary to store the glass, place it on edge in piles with paper between each two lights, and do not pile it in a damp place, or where the air is moist. If the glass has become wet in transit it should be thoroughly cleaned and dried. Put the piles upon pegs to provide for a free circulation of air on all sides. All this is necessary to prevent what is known as "stain," which is one of the most troublesome and annoying conditions to be found in handling glass.

CARE OF PLATE GLASS

The characteristic appearance of stain is either a faint whitish scum seen in patches on the surface or a slight dimming, which, when held in

PACKING AND HANDLING PLATE GLASS

reflected light, produces iridescence. The most serious case of stain has the appearance of deep etching, similar to the effect that is produced when glass is splashed with etching-acid and allowed to dry. The surface of the glass is damaged by corrosion as steel is damaged by rust, and the extent of this corrosion produces all the varieties of stain, from something almost imperceptible to a heavy scum. The liability of plate glass to stain depends on its composition, on the treatment it has received in storage and in transit, and on the climatic conditions to which it has been subjected.

If the glass is subjected to a warm, humid, or putrid atmosphere in which ammonia is usually present, it is very liable to stain, and especially when two surfaces are left in contact.

Polished glass cannot withstand the action of alkalis. The surface is attacked and although it is not immediately stained it later on stains very readily. On the other hand, it has been found that acid solutions have less corrosive action on glass than even water alone.

HOW TO AVOID STAIN

Plate glass is composed of a mixture of sodium and calcium silicates. The sodium silicate is the more soluble constituent. Water condenses on the surface and immediately begins to dissolve minute quantities of sodium silicate. The calcium silicate is hydrolized and sets free hydrate of lime and hydrated silica. When these compounds dry out on the glass the surface becomes slightly dim. If the staining has not been allowed to go too far, it may be removed by the usual method of cleaning without seriously affecting the surface of the glass. If it has gone too far, the surface is destroyed, becoming covered with minute scales or crystals of silica which cannot be removed without repolishing.

If moisture is left between two or more plates of glass or gets there by condensation, and does not dry out quickly, a concentrated solution of silicate of soda will finally be produced and then, if by chance the plates become dried out, they will be found cemented together.

Glass made by the Pittsburgh Plate Glass Company is composed of the best possible proportions of soda, lime, and sand, with the special object in view of producing the most practical resistant plate glass, and one which, therefore, has the least tendency to stain.

CUTTING PLATE GLASS

Plate glass cannot be cut commercially by any machine operation. If only a small number of plates are required, they may possibly be cut by one man and be closely uniform in size, but where the number is large, they must necessarily be cut by many different cutters, and the personal element entering into the accuracy of the work will cause some variation in the sizes. For this reason, an allowance of at least one-sixteenth of an inch over and under the specified size is generally required. Provision for this slight variation in size can be made easily in designing the sash or frame in which the glass is to be used.

THICKNESS OF PLATE GLASS

Plate glass is manufactured in all thicknesses from $\frac{3}{32}$ inch to $1\frac{1}{2}$ inch. The standard thicknesses run from $\frac{7}{32}$ inch to $\frac{5}{16}$ inch. For glass above or below these limits an extra price is charged. Glass cannot be furnished to an exact thickness, and for thicknesses known as $\frac{1}{8}$, $\frac{3}{16}$ and $\frac{1}{4}$ inch, a tolerance of $\frac{1}{32}$ inch over and under the specified thickness is required. For glass over $\frac{5}{16}$ inch thick, an allowance of $\frac{1}{16}$ inch over and under the specified thickness is required. This does not mean that all the plates will show the extremes in thickness. If glass is ordered $\frac{3}{16}$ inch thick, the thinnest plates probably will be $\frac{5}{32}$ inch thick, and the thickest plates $\frac{7}{32}$ inch thick, but the general run of the glass will be close to the specified $\frac{3}{16}$ inch thickness. If a large number of plates are required the usual allowance of $\frac{1}{32}$ inch over and under thickness should be increased if prompt shipment is required, and a liberal interpretation of specifications must be given if such business is to be either profitable or desirable to any manufacturer.

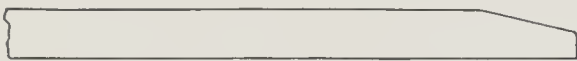
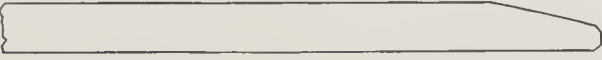
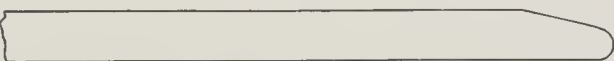
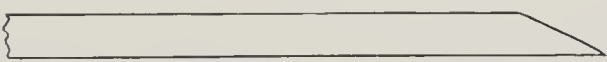
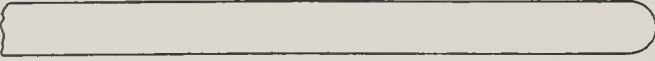
SIZES OF PLATE GLASS

Plate glass can readily be made in extreme sizes up to 250 square feet, and in such measurements as 10 x 21 feet (120 x 252 inches), containing 210 square feet; or 12 x 20 feet (144 x 240 inches), containing 240 square feet; or 13 x 19 feet (156 x 228 inches), containing 247 square feet.

Plates have been made containing as high as 300 square feet, but such extreme sizes are not to be recommended; they are difficult to make,

PITTSBURGH PLATE GLASS COMPANY

VARIOUS EDGES AND BEVELS ILLUSTRATED

- 0  Bev. $\frac{1}{2}$ " Clean Cut Edge
- 1  Bev. $\frac{1}{2}$ " Flat Polished Edge
- 2  Bev. $\frac{1}{2}$ " Chamfered Polished Edge
- 3  Bev. $\frac{1}{2}$ " Round Polished Edge
- 4  Polished Mitered Edge
- 5  Flat Polished Edge
- 6  Round Polished Edge
- 7  Half Round Polished Edge
- 8  Chamfered Polished Edge
- 9  Top Chamfered Polished Edge
- 10  $\frac{3}{4}$ " Bevel
- 11  1" Bevel
- 12  $1\frac{1}{4}$ " Bevel
- 13  $1\frac{1}{2}$ " Bevel
- 14  $1\frac{3}{4}$ " Bevel
- 15  2" Bevel

BEVELING, EDGEWORK, AND HOLES

expensive to handle, and undesirable as regards maintenance. They must be made to order and therefore cannot be replaced promptly if broken.

Special flat-car shipment, special facilities for unloading and hauling, and unusual care in setting, all add to their cost.

BEVELING, EDGEWORK, AND HOLES

Plates with beveled edges are used for ornamental purposes, as in door lights, mirrors, and leaded glass, and for practical purposes, as, for instance, in the top of show cases where a thick plate fits into a shallow rabbet. This work is done in a special department and requires experienced men trained in the various processes.

In actual result, the bevel is a simple enough thing. But in practice it is one of the highly specialized operations of the glass manufacturing plant. It entails many manipulations of minute accuracy, for in this brilliant material the slightest irregularity of measurement would be glaringly evident to the human eye. A large section of glass must be ground away, and this means abrasive work on one of the hardest materials made; yet the finished bevel must present a smooth and highly burnished surface.

THE BEVELING PROCESS

For these reasons the work of beveling compels the passage of plate glass through five divisions of workmen: roughers, emeriers, smoothers, white-wheelers, and buffers or polishers.

The roughing wheel is a cast-iron disk about twenty-eight inches in diameter, which revolves in a horizontal plane. Rough sand or carborundum is fed on to the revolving disk from a hopper suspended above the mill. The rougher places the edge of the glass upon the rapidly revolving wheel and the cutting and grinding of the bevel is done by the friction of the abrasive between the face of the glass and the wheel. The angle of the bevel is determined by the angle at which the rougher holds the plate of glass in relation to the plane of the disk. When the work of the roughing is completed, the bevel has an extremely rough ground surface which must be smoothed and fined before it can be polished. The remaining four steps in the beveling process are all performed to give the final polish to the rough edge left by the first process.

An operation similar to the roughing is performed on the emery mill, which is identical

with the roughing mill except that emery is used as an abrasive instead of sand or coarse carborundum. This process converts the rough sand-lashed surface that was left by the roughing process into a comparatively smooth surface.

From the emery wheel the plate goes to the smoother, who uses a sandstone disk of fine texture without any abrasive. This operation produces an extremely fine surface ready for polishing, but a surface that is white and obscure.

The plate is next applied to a "white-wheel," which is an upright wheel made of poplar, revolving in a vertical plane, on which is fed powdered pumice and water. This operation gives the bevel a semi-polished, semi-transparent surface, which is converted into the high gloss of the finished product by the final process on the buffing wheel.

These four steps in refinishing the rough edge left by the roughing process give the finished bevel a surface not greatly different from the original surface of the polished plate.

Pattern plates can be beveled as well as squares, although plates with sharp in-curves are difficult and are likely to break in the process.

The width of bevel most commonly used for the larger door plates is 1½ inch, for the larger size furniture plates 1¼ inch, and for the smaller size in furniture and door plates one inch. Showcase plates usually receive a half-inch bevel. Bevels wider than two inches are impracticable. The width of the bevel desired should always be specified when ordering.

POLISHED EDGEWORK

A large amount of glass is used today with polished edges for such purposes as show-case tops, plates to cover tops of furniture, and windshields, wing-guards, drop windows, and other adjustable glass plates used in automobiles. The edges of these plates are produced on the same machines as the beveled plate by exactly the same operations, the only difference being in the manner in which the glass plates are presented to the various machines.

PITTSBURGH PLATE GLASS COMPANY



"Grinding On." or "Roughing On" the Bevel

The glass is held against a horizontal disk revolving in the trough and sand or carborundum is fed from the hopper.

For the usual flat polished edge, the glass is held at right angles to the machine and the lower edge of the plate roughed, smoothed, and polished.

To produce a round polished or penciled edge the plate is similarly held but, as the operation proceeds, the plate is also rocked from side to side, thus causing the roughing and subsequent operations to form a rounded instead of a flat edge. As may be noted in the drawing on page 196, sixteen different types of finished edges and bevels may be obtained from the Pittsburgh Plate Glass Company.



Smoothing the Bevel

From the grinder the glass goes to the smoother, who uses a grindstone without any abrasive.

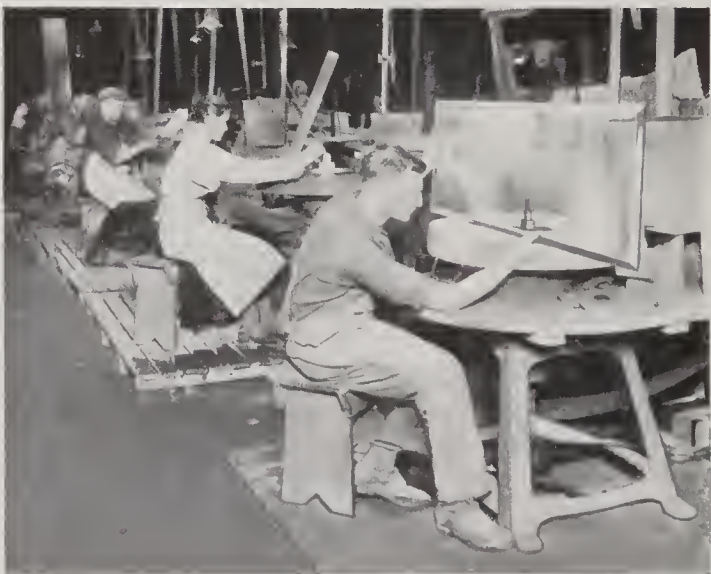
In the use of plate glass with special bevels or edges it frequently is necessary to have holes drilled in the glass for the accommodation of special attachments. These holes may be drilled in reasonable number and size without much risk of breakage.

Plates may be cut to simple patterns and the edges beveled or polished, or both. Should the required shape of plates involve in-curves or out-curves, the manufacturer should be consulted, for it is for him to determine whether or not the required plate can be produced without undue risk of breakage.



Using the "Buffing Wheel"

The bevel is now polished by means of the "buffing wheel." Felt and rouge are the polishing agents.



Finishing the Edges of the Bevel

Polished edges are produced in much the same manner as beveled edges.

BENT GLASS

BY bent glass is meant glass curved in various degrees and at various angles to produce handsomely shaped all-glass effects in places where otherwise there would have to be ordinary corners formed by joints, usually of opaque material.

Inclosures for cashiers and bookkeepers and other glass office partitions gain immensely from such curved corners. The whole scheme of a room or a building is lifted to a degree of distinction whenever bent glass is made a definite part of the plan throughout.

Bent glass is essentially a structural glass, playing its important part in the composition of a building, interior and exterior. In addition, however, it lends itself to other forms of service, such as furniture, show cases, safety guards for machinery and electric installations, and other miscellaneous uses.

Bent polished plate glass has brought a final and unique beauty to the automobile, by providing the one means for making windows that will conform to the lines of the body and impart to the machine as a whole, distinction and graceful shapeliness.

For the owner and passenger the bent plate glass window obviously adds to the pleasure of every journey—a pleasure intensified by the satisfaction of knowing that the exterior appearance of the motor car is equally admirable.

Bent plate glass offers many opportunities to the designers of handsome railroad and street cars. Big and little problems of angles and corners frequently can be solved by introducing this excellent structural material instead of attempting to build up with joints. Thus are obtained improved appearance and increased comfort for passengers along with marked economy in construction.

The ship-builder and small-boat designer will find the same practical reasons hold good in their field. The glass-cabin motor boat, for example, gains immeasurably both in style and in usefulness from having bent glass corners forward and aft. On large vessels, as the naval architect knows, there are innumerable uses for bent plate glass where strength and clear vision are important considerations.

HOW GLASS IS BENT

Bent glass is produced by treating glass sheets that have been made and finished in the regular glass-making processes and involves heating the sheet or plate of manufactured glass till it softens sufficiently to bend into the desired shape.

Every kind of sheet glass can be brought to bent form; therefore the intending user must be careful to specify exactly what kind he wants. There is, for example, bent glass that is common window glass, and there is also a beautifully massive, polished glass as brilliant as cut crystal, which is bent polished plate glass. Rough and ribbed glass, wire glass, opalite, vitrolite, and Carrara Glass are all bent as required.

Plate glass is, of course, the best glass for bent glass purposes wherever transparency is required, because a chief reason for the use of bent glass is desire for combined beauty and strength—distinctive properties of plate glass.

It happens, too, that plate glass admits of being bent into regular curves and many irregular ones without the slightest loss of its distinctive qualities. The polished surface retains all its richness and elegance. The vision-property is not affected in the least, for the bending is done in such a manner that it produces no changes in the structure of the glass. Therefore its value for “seeing through” is as perfect after being bent as before.

For the production of bent glass special ovens, also called kilns, are needed. The floors of the ovens are deep beds of pulverized clay and sand, and in these the workmen scoop out cavities of the exact form and depth required for any specific shape that a sheet of glass is to take. After strips of iron are imbedded in the sides, the mould is ready.

A plate of glass is laid flat over this excavated mould. Its sides are held by the iron strips, but the ends are unsupported. The oven doors are closed and the fire is started, the heat being applied very carefully and increased very slowly for some hours, until the plate of glass becomes soft enough to be plastic, which is when it is a little above red heat.

When it reaches the plastic stage, it bends slowly of its own weight, and naturally sinks into

PITTSBURGH PLATE GLASS COMPANY

the mould, thus assuming its curvature under the best possible conditions, without strains or stresses such as would arise if attempts were made to bend it forcibly.

The heat is shut off as soon as the glass has

assumed the shape of the mould. The kiln is kept closed, however, for another twenty-four hours in order to anneal the glass and permit it to cool back to normal temperature without stresses and strains.

SIZES AND CURVES OF BENT PLATE GLASS—HOW TO ORDER

THE Ford City plant of the Pittsburgh Plate Glass Company is equipped with bending kilns that can bend a plate to any size up to a maximum of about 144 x 100 inches.

When ordering bent glass, the width (the measurement around the curve) should be specified first, and then the height, or straight dimension. All measurements of bends should be made over the convex surface of the glass.

If glass is to be bent to a regular curve (an arc of a circle), it is necessary only to specify first the width, then the height, and then the radius of the required arc. All measurements must, of course, be accurate.

It is most desirable that a pattern or template of sweep be submitted in all cases, even when regular curves are ordered. In the case of irregular curves, such a pattern, drawing, or template is of the utmost importance. It should show always the convex side of the glass, with distinct marks to indicate where the edges of the glass will come on the drawing after bending.

If a required bend is not a true rectangle, there must be information showing which is the convex or concave side of the glass in relation to the template or drawing furnished for the bend. If errors are to be avoided in orders for compound bends (plates bent in both dimensions), full-size forms or templates should be furnished, the templates being an exact duplicate of the convex side of the glass that is required.

When beveled, chipped, or lettered plates, or Florentine, maza, and other pattern glass are to be bent, there must be plain information as to which side of the glass is to be concave or convex.

For bent wire glass, the information must show in which direction the mesh is to run. For ribbed or prism glass bending, there must be instructions as to whether the ribs are to run horizontally or vertically.

Plates requiring bends in both directions, or on both dimensions of the glass, generally ne-

cessitate a specially made iron mould, because it is not practicable to excavate such a mould in the clay floor of the oven. These iron moulds must be of very heavy construction in order not to warp or change curvature under the great heat. This fact usually makes them expensive.

It is not desirable to bend plate glass to a curve exceeding a half-circle, or to acute bends resembling right angles; for such extreme curves involve great risk of breakage and of injury to the polished surface.

There is a limit to the heating of plate glass, because heating beyond the right point will cause fine particles of the softened glass to stick to the mould, thus destroying the finely polished surface. Some sharp curves and bends would require such high temperatures that they could not be obtained without very materially roughening the plate glass surface—a damage technically called “burn.”

Plates of irregular shapes, and especially those with cash-openings or speaking-holes cut, for bank fixtures, ticket offices, and similar places, cannot be bent without great risk of breakage. Orders for glass of such character are accepted only with the understanding that the customer assumes the cost of all plates that may be damaged in the bending process.

In bending wire glass, experience has demonstrated that breakage is excessive in thicknesses over three-eighths of an inch.

Users of glass in making their calculations must bear in mind that specifications for bent glass cannot be interpreted as critically as for metals. Curves of bends will be accurate for practical purposes; but they will not be microscopically accurate, because glass cannot be operated on after cutting or bending, to correct trifling discrepancies in curvature or dimension.

Specify width (measurement around curve) first, and then the height. Preferably submit pattern or template of sweep in all cases.

BENT PLATE GLASS

EXPLANATION OF CURVES AND DIAGRAMS



A—Curves are those which are bent to a given radius one way of the pane only, which applies to the whole length or width of the pane, and not to one part only, the depth of bend not to exceed one-eighth of the length of the bent side of pane. Example, length of the bent side of pane, 96 inches, depth of bend not above 12 inches.

B—Curves are those which are bent more than one-eighth, but not to exceed the quarter of a circle, or about 1 in 5½. Example, pane 77 inches, bend 14 inches.

C—For the same curve as B, but a part flat, the flat part not to exceed one-third. Example, pane 72 inches, bend 48 inches, flat 24 inches.

D—For flat curves, with one part flat, the depth of the bent part not to exceed 1 in 12, and the flat part one-half. Example, pane 72 inches, bend 36 inches, depth 3 inches, flat 36 inches.

E—For curves, the bent part not less than a 6-inch radius, and not to exceed the quarter of a circle, with flat part, the flat part to exceed one-third but not to exceed two-thirds. Example, pane 72 inches, bend 24 inches, flat 48 inches.

F—Curves are those which are bent beyond the quarter of a circle, but not to exceed 1 in 4. Example, pane 84 inches, depth 21 inches.

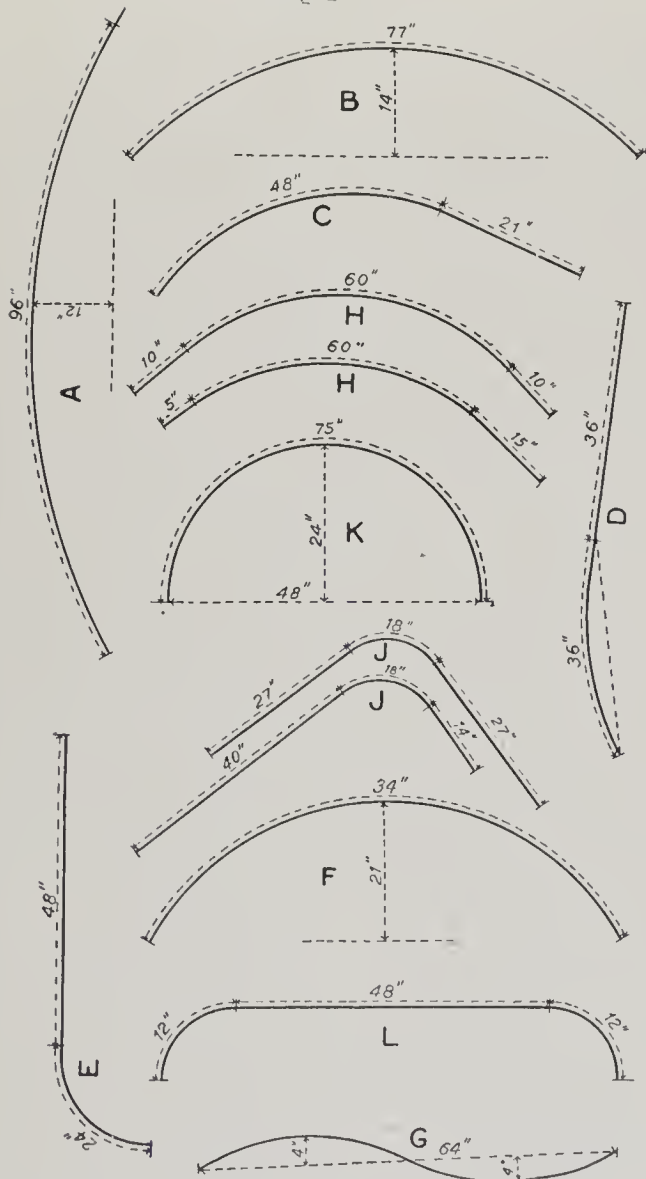
G—For OC curves, depth not to exceed 1 in 16. Example, pane 64 inches, depth 4 inches.

H—For angular curves, viz.: Flat parts on each side, the centers not to exceed the quarter of a circle, the end flat parts one-fourth of the sides bent. Example, pane 80 inches, bend 60 inches, flat 10 inches, each side, or about 5 inches on one side and 15 inches on the other.

J—For angle curves (radius not less than 6 inches), the center not to exceed the quarter-circle, and the flat to exceed one-fourth, but not to exceed three-fourths. Example, pane 72 inches, bend 18 inches, flat 27 inches, each side, or about 14 inches on one side and 10 inches on the other.

K—Curves are those which are bent beyond 1 in 4 but not to exceed the half-circle (diameter not less than 12 inches). Example, pane 75 inches, depth about 24 inches.

L—Curves not to exceed the quarter of a circle at each side (depth of bend not less than 6 inches), the bent part not less than one-third, and the flat not more than two-thirds. Example, pane 72 inches, bend 12 inches, each side, center flat 48 inches.





Setting a Large Window

Skillful window setters are employed by all the Warehouses of the Pittsburgh Plate Glass Company. In the picture, an unusually large pane is being put in place. This is an operation requiring great care if financial loss is to be avoided. Although this glass has not yet been cleaned, its transparency is so nearly perfect that it is hard to detect the pane in the picture.

THE GLAZING OF STORE FRONTS

IN SETTING plate glass in wood or iron frames in a store front the glass should be thoroughly bedded in putty. In copper construction there is no need for putty. As to the proper kind of setting blocks, opinions differ, as on many other points connected with glazing. We are left to choose between heavy pads of felt, lead or iron covered with leather, soft wooden blocks, and other such devices. Whatever blocks are used should be placed about ten to twelve inches from each end of the plate. More than two blocks are not required, though proper care should be used to prevent the glass from coming in contact with metal.

After the preliminary work has been attended to, the glass should be lowered into the rabbet with the aid of slings consisting of strong cotton webbing measuring about four inches wide and five feet long. The Pittsburgh Plate Glass Com-

pany stocks this webbing and will furnish it at a nominal charge.

The bottom of the glass should be placed on the setting blocks, keeping the top away from the frame. When once properly placed, allow the top to move slowly into position. In the event that the glass binds on either side, this may be overcome by increasing the height of the setting block at that end of the glass. If it is a trifle high, the setting blocks can be taken out and made thinner. Again, if the glass is much too large, it may be necessary to cut it to the right dimension.

When in position the slings should be removed, not by pulling sidewise, but by pulling them straight up parallel with the glass. Press the glass firmly against the frame and proceed to attach the mouldings.

If the frame is of wood, care should be used

THE GLAZING OF STORE FRONTS

not to toenail the mouldings, because then too much pressure will be brought against the glass. These nails should be driven straight.

If plates are taken from the box at the job, workmen should be careful to lift the glass high up over the edge of the box while removing it. Otherwise failure to clear the edge will be likely to break the glass. Glass required for different street addresses should be numbered and marked for the purpose of identification.

Too much care cannot be used in setting copper corner and division bars. The glass must be cut to correct dimensions to extend into the rabbet and the bar properly adjusted to insure uniform tension the full length of the bar. Division bars should not be anchored until this work has been completed.

When the work is properly completed, the glazier's responsibility ceases, and if insurance is desired it should be placed at once.

BREAKAGE RESULTING FROM POORLY CONSTRUCTED BUILDINGS

BREAKAGE sometimes is directly traceable to **I** beams of insufficient weight to carry the load and to want of proper foundations; especially when to these conditions there is added vibration due to heavy traffic. The sills under the plate glass sometimes are found to be made up of one piece of heavy lumber. This heavy block swells and warps when wet, forcing the front out of alignment. Heavy lumber of this kind has no place in a front, and if used should be kept protected from the elements. Cases have been known where ice has formed in and around these heavy blocks, breaking a number of the plates in a front.

Breakage also may be due to the use of wide or heavy furring or rabbet strips. These strips should be narrow, not to exceed two or three

inches; when too wide there is danger of swelling and forcing the glass.

In the laying of the bulkhead floors, provision should be made for the swelling of the flooring when wet—in other words, space should be allowed to permit of normal swelling. This will prevent the sill being forced out of line.

Breakage at times is caused by transom bars being too light. When bars are not strong, or properly reinforced so as to withstand wind pressure, breakage probably will result. If door posts are light, or if they do not extend to the ceiling, it is hard to install them in a manner that will not result in breakage. Heavy construction is required to prevent this. Particularly is this true if no door-check is used or when a door-check is out of order.

STEEL SASH GLAZING

SASH of this kind may be used for window, wire, rough, or ribbed glass. They are practically never used for plate glass.

In three particulars, glazing of steel sash as compared with the glazing of wood sash differs quite materially. First of all, steel sash are erected and anchored in place in the walls of the building before being glazed, whereas it is customary to lay wooden sash on horses for glazing. Secondly, it is necessary to use special putty for steel sash, because it is not possible for the metal to absorb the oil in linseed oil putty, which, of course, makes it impossible for the putty to harden. Thirdly, the glass is set from the inside of the sash instead of from the outside.

Litharge putty, the kind used for this purpose, can be obtained either from the manufacturers

of sash or from the firm supplying the glass. The putty should be sent to the job in steel, air-tight cans; if in wood barrels the putty has to be used as soon as it reaches the job, because the hardening of the putty begins with its exposure to the air, and in a short time it is impossible to work with it. It is quite essential, in order to have the putty adhere properly to steel sash, that the metal should be perfectly dry. It is not possible to glaze these sash in damp weather.

A contrivance very much on the order of ladder jacks is used by glaziers to support the planks from which they do their work.

Standard sizes of glass used in steel sash are 14 x 20s, 12 x 18s, and 10 x 16s. If there are ventilators in the sash it is necessary to trim the outside edges of the lights going into the

PITTSBURGH PLATE GLASS COMPANY

ventilators approximately one inch. Exact sizes should be secured and the glass cut to fit before starting. The first step in the setting of the glass is to place a small quantity of putty at the back and sides of the rabbet in order to provide a bed for the glass. The glass is pressed in place so that any excess putty may work out on the face of the steel sash. The spring clips which are furnished by the manufacturers are then inserted in the holes provided for them, after which the putty is run around the glass on a bevel covering the clips, making the appearance the same as in the ordinary type of wood-sash glazing.

The function of the spring clip is to hold the glass in place while the putty is hardening. This should occur in a comparatively short time. When the putty is thoroughly dry it becomes so hard that it is necessary to use a chisel to remove it. This method of glazing is for the ordinary type of steel sash.

If the Underwriters' type of steel sash is used, it will be necessary, after the putty has been spread in the rabbet and the glass set in place, instead of using the spring clips, to attach angle-iron stops to the frames by means of bolts. These stops and bolts will be found attached to the frames and must be removed by the glazier before commencing to set the glass.

After these stops are bolted on to the frames, it will be necessary to run as much of the putty as possible in between the glass and stops, to prevent contact of glass with metal.

In the glazing of saw-tooth or monitor sash, the bed of putty should be much heavier than in the ordinary side-wall sash. After the glass has been pressed tightly in place, fill in the space between the edge of the glass and the metal with putty; then with the putty knife cut it off even with the face of the glass. This method of setting the glass in the monitor sash applies to most types, but some manufacturers require in addition the face-puttying, which is done in the usual manner, but requires a very deep bevel.

Be sure that the sash and the face-putty are not painted for two or three weeks after glazing. This is in order to secure thorough drying of the putty, because after paint is applied the putty does not dry well.

After completing the glazing of sash in which ventilators occur, whether in side-wall sash or in monitors, be careful to have all ventilators fastened or wired securely to prevent the wind from blowing them open and breaking the glass.

When glazing steel sash in winter months, it will be necessary to warm the putty in order to make it soft enough to handle.

SETTING AUTO GLASS

IT IS important that every glass dealer should learn to do this work. If supplied with the right tools and materials, it is not so difficult as might seem. A carborundum stone, plate glass pliers, steel wheel cutters, rubber mallet, felt, insulating tape, and a Perfection glass-board complete the outfit. The glass should be cut to fit, the rounded corners nipped with the pliers, the rough edges smoothed with the carborundum stone, the tape and felt applied, and the glass placed in position. With the aid of the rubber

mallet, it can be made to fit tightly without injury to glass.

STOPPING A BREAK

In cutting around breaks, examine the glass to ascertain how far the break extends. This is very hard to determine because the crack cannot always be seen for its full length. With a steel wheel cut a circle ten to twelve inches around this point and tap the plate in the usual way until the crack is plain and the glass is broken clear through.

BOXING

THE customary charge for boxing on orders amounting to less than a stipulated figure, and of a less number than three plates of whatever value, at times has prompted purchasers to inquire if boxes might be returned for credit. These boxes are constructed for each individual

order. If returned they must be knocked down and rebuilt to different dimensions. Any saving that may be effected in the lumber recovered is largely offset by the freight, cartage, and additional labor expense. To re-use these boxes, accordingly, is not practicable.

THE SETTING OF PLATE GLASS



SETTING GLASS ABOVE GRADE FLOORS

THE plate shown in the illustration is perhaps as large in footage, and also as regards both the width and the height, as any sheet of plate glass ever set above the grade floor.

To install such a plate in the upper windows is not an easy task. In this instance it was decided to deliver the glass to the building in the box in which it was received. It was then hoisted to the opening by a beam rigged out from the seventh floor with a Triplex pulley attached. It was found necessary to remove the sill in order to allow the case to pass into the building. The height of the opening slightly exceeded the width, thus making it necessary to up-end the glass. This was done before

it was removed from the box. Twenty experienced workmen were required to do the work; and while the setting was a most unusual one, it was executed according to plan without any untoward incident whatsoever.

The custom is, however, to deliver large plates for setting above the grade floor in the same way that other glass is delivered to the job. Twenty-four-foot scaffolds are used for this purpose. Underneath the glass is brought a strong sling of webbing, with rings attached to each end, similar to and of about the same length as a saddle girth. Ropes are passed through the rings and the men above lift the glass on to the scaffolding and thence into the opening.



WINDOW BRACES

PRACTICAL men in the business have debated at times as to whether window brackets of the kind illustrated above possess any real merit. Men of wide experience in handling glass, however, seem to regard them with considerable favor. They maintain that if, and when, the brackets are properly installed and adjusted, they render material aid in supporting the glass against wind pressure.

Merchants evidently think well of the innovation, for we are informed that the manufacturers receive orders from all parts of the country. Plate glass insurance companies, however, have not as yet given the device recognition.

These brackets are made, in the solid part, from $\frac{5}{16}$ x $1\frac{1}{2}$ -inch iron. The arm consists of

one-inch hollow tubing screwed into the bracket portion. In that portion of the arm projecting toward the glass, a shaft is attached, in the end of which is inserted a rubber wheel that rests against the surface of the glass. This bracket is adjusted with a set screw to bring against the glass the pressure required to absorb vibration.

Another style of this window brace is one that is attached at the transom and does not extend to the ceiling. In all other respects it is the same.

The brackets are made to order to fit individual windows. When ordering, furnish a sectional view of the window, together with the exact measurements of the glass and the woodwork, particularly the distance from the ceiling to the transom bar. Also specify the finish desired.

RESILVERING MIRRORS

IT IS often taken for granted by the customer (and sometimes by the dealer, too) that in the process of resilvering a mirror a real effort is directed to making over the glass itself. This is incorrect. Even if it were considered practical to polish out scratches and other defects commonly found in old mirrors, such work would be most expensive. The cost of the labor alone amounts to appreciably more than the cost of brand-new glass; yet there are cases where such expectations have led to considerable disappointment. It is important that the dealer should

explain these matters clearly: that in the process of resilvering a mirror no effort at all is made to improve the quality of the glass itself, and that the old silver has to be removed, the glass carefully cleaned, and new silver applied.

German imported mirrors, or thin $\frac{1}{8}$ -inch mirror plates, cannot be accepted for resilvering. They are too easily broken. The resilvering of mirrors always is done at customer's risk.

Bill of lading with proper instructions always should be forwarded, and mirrors should be removed from frames before shipping.

MISCELLANEOUS INFORMATION

MAXIMUM SIZES, THICKNESSES, AND APPROXIMATE NET AND GROSS WEIGHTS

PLAIN FIGURED GLASS

STYLE	Thick- ness Inches	Maxi- mum Width Inches	Maxi- mum Length Inches	Approximate Net Weight per Sq. Ft.	Approximate Shipping Weight per Sq. Ft.
Florentine.....	1/8	48	132	2 lbs.	2 1/2 lbs.
".....	3/16	48	132	2 1/2 lbs.	3 1/4 lbs.
Syenite.....	1/8	48	132	2 lbs.	2 1/2 lbs.
".....	3/16	48	132	2 1/2 lbs.	3 1/4 lbs.
Moss.....	1/8	48	132	2 lbs.	2 1/2 lbs.
".....	3/16	48	132	2 1/2 lbs.	3 1/4 lbs.
" (Thin).....	3/32	40	126	1 3/4 lbs.	2 1/4 lbs.
Maze.....	1/8	48	132	2 lbs.	2 1/2 lbs.
".....	3/16	48	132	2 1/2 lbs.	3 1/4 lbs.
Holly.....	1/8	48	132	2 lbs.	2 1/2 lbs.
".....	3/16	48	132	2 1/2 lbs.	3 1/4 lbs.
Mystic.....	1/8	44	132	2 lbs.	2 1/2 lbs.
".....	3/16	44	132	2 1/2 lbs.	3 1/4 lbs.
Muranese.....	1/8	42	110	2 lbs.	2 1/2 lbs.
Ondoyant.....	1/8	30	110	1 3/4 lbs.	2 1/4 lbs.
Fig. No. 2.....	1/8	42	110	2 lbs.	2 1/2 lbs.
Fig. No. 2.....	3/16	42	110	2 1/2 lbs.	3 1/4 lbs.
Romanesque.....	1/8	48	132	2 lbs.	2 1/2 lbs.
".....	3/16	60	132	2 1/2 lbs.	3 1/4 lbs.
Hammered Cathedral.....	3/32	30	90	1 1/2 lbs.	2 lbs.
Double Rolled ".....	3/32	30	90	1 1/2 lbs.	2 lbs.
Opalescent ".....	3/32	30	90	1 1/2 lbs.	2 lbs.
Opal.....	1/8	30	40	1 1/2 lbs.	2 lbs.
Rippled.....	1/8	30	90	1 1/2 lbs.	2 lbs.
Rippled (Thin).....	3/32	30	90	1 1/4 lbs.	1 3/4 lbs.
Colonial.....	1/8	44	160	2 lbs.	2 1/2 lbs.
".....	3/16	44	160	2 1/2 lbs.	3 1/4 lbs.
Pyramid.....	1/4	48	132	3 3/4 lbs.	4 1/2 lbs.
Carnation.....	1/8	48	132	2 lbs.	2 1/2 lbs.
".....	3/16	48	132	2 1/2 lbs.	3 1/4 lbs.
Liberty.....	1/8	48	126	2 lbs.	2 1/2 lbs.
".....	3/16	48	126	2 1/2 lbs.	3 1/4 lbs.
Cobweb.....	1/8	54	120	2 lbs.	2 1/2 lbs.
".....	3/16	54	126	2 1/2 lbs.	3 1/4 lbs.
".....	1/4	62	120	3 3/4 lbs.	4 1/2 lbs.
".....	3/8	62	120	5 lbs.	6 lbs.
Aqueduct.....	3/16	54	120	3 1/4 lbs.	4 lbs.
".....	1/4	60	120	4 1/2 lbs.	5 1/4 lbs.
".....	3/8	60	120	5 3/4 lbs.	6 3/4 lbs.

PRISM GLASS

Prism (Sheet) Thin.....	1/4	42	120	3 1/2 lbs.	4 1/4 lbs.
Prism (Sheet) Regular.....	5/16	60	138	4 lbs.	4 3/4 lbs.
Glazed Prism Tiles.....	3/16			5 1/4 lbs.	6 1/2 lbs.
Prism Wired Glass.....	3/8	42	138	5 lbs.	6 lbs.
Pentecor.....	1/8	48	132	2 1/2 lbs.	3 lbs.
".....	3/16	48	132	3 lbs.	4 lbs.
"Imperial" Prism-Plate Glass.....	3/8	72	82	4 1/2 lbs.	5 1/4 lbs.

ROUGH, RIBBED OR CORRUGATED

Rough.....	1/8	48	132	2 lbs.	2 1/2 lbs.
".....	3/16	48	132	2 1/2 lbs.	3 1/4 lbs.
".....	1/4	62	136	3 3/4 lbs.	4 1/2 lbs.
".....	3/8	62	132	5 1/4 lbs.	6 lbs.
".....	1/2	140	240	7 1/2 lbs.	8 lbs.
Ribbed.....	1/8	48	132	2 lbs.	2 1/2 lbs.
".....	3/16	48	132	2 1/2 lbs.	3 1/4 lbs.
".....	1/4	62	136	3 3/4 lbs.	4 1/2 lbs.
".....	3/8	62	132	5 1/4 lbs.	6 lbs.
".....	1/2	48	130	7 1/2 lbs.	8 lbs.

WIRED GLASS

STYLE	Thick- ness Inches	Maxi- mum Width Inches	Maxi- mum Length Inches	Approximate Net Weight per Sq. Ft.	Approximate Shipping Weight per Sq. Ft.
Polished Wired Glass.....	1/4	48	130	3 3/4 lbs.	4 1/2 lbs.
".....	5/16	48	130	4 lbs.	4 3/4 lbs.
".....	3/8	46	130	8 lbs.	8 1/2 lbs.
Maze.....	1/4	48	130	3 3/4 lbs.	4 1/2 lbs.
".....	3/8	48	130	5 1/4 lbs.	6 lbs.
Romanesque.....	1/4	48	130	3 3/4 lbs.	4 1/2 lbs.
Syenite.....	1/4	48	130	3 3/4 lbs.	4 1/2 lbs.
Muranese.....	1/4	42	110	3 3/4 lbs.	4 1/2 lbs.
Cobweb.....	1/8	48	130	2 lbs.	2 1/2 lbs.
".....	3/16	48	130	2 1/2 lbs.	3 1/4 lbs.
".....	1/4	48	130	3 3/4 lbs.	4 1/2 lbs.
".....	3/8	48	130	5 1/4 lbs.	6 lbs.
Holly.....	1/4	48	130	3 3/4 lbs.	4 1/2 lbs.
".....	3/8	48	130	5 1/4 lbs.	6 lbs.
Prism.....	3/8	42	138	5 lbs.	6 lbs.
Pentecor.....	1/4	40	130	4 lbs.	5 lbs.
Pyramid.....	1/4	48	132	3 3/4 lbs.	4 1/2 lbs.
Aqueduct.....	3/32	48	132	4 1/4 lbs.	5 lbs.
Rough.....	1/8	48	130	2 lbs.	2 1/2 lbs.
".....	3/16	48	130	2 1/2 lbs.	3 1/4 lbs.
".....	1/4	48	130	3 3/4 lbs.	4 1/2 lbs.
".....	3/8	48	130	5 1/4 lbs.	6 lbs.
".....	1/2	48	130	7 1/2 lbs.	8 lbs.
Ribbed.....	1/8	48	130	2 lbs.	2 1/2 lbs.
".....	3/16	48	130	2 1/2 lbs.	3 1/4 lbs.
".....	1/4	48	130	3 3/4 lbs.	4 1/2 lbs.
".....	3/8	48	130	5 1/4 lbs.	6 lbs.
".....	1/2	48	130	7 1/2 lbs.	8 lbs.
Rough Wire Floor Glass.....	3/4	12	12	8 lbs.	9 3/4 lbs.
Ribbed ".....	3/4	12	12	8 lbs.	9 3/4 lbs.
Ground ".....	3/4	12	12	8 lbs.	9 3/4 lbs.

POLISHED FIGURED GLASS

Apex.....about	1/4	50	100	4 lbs.	4 3/4 lbs.
Ideal.....	1/4	54	130	4 lbs.	4 3/4 lbs.
Pyramid.....	1/4	48	132	4 lbs.	4 3/4 lbs.
"Imperial" Prism-Plate.....about	1/4	70	82	3 3/4 lbs.	4 1/2 lbs.
" Style 01.....	1/4	70	82	3 3/4 lbs.	4 1/2 lbs.
" Style 02.....	1/4	70	82	3 3/4 lbs.	4 1/2 lbs.
" Style 03.....	1/4	70	82	3 3/4 lbs.	4 1/2 lbs.
" Style 04.....	1/4	70	82	3 3/4 lbs.	4 1/2 lbs.
" Style 05.....	1/4	70	82	3 3/4 lbs.	4 1/2 lbs.

POLISHED PLATE GLASS AND MIRRORS

STYLE	Thickness Inches	Approximate Net Weight per Square Foot
	1/8	1 lb. 10 oz.
	3/16	2 lbs. 7 oz.
	1/4	3 lbs. 4 oz.
	5/16	4 lbs. 2 oz.
	3/8	4 lbs. 14 oz.
	1/2	6 lbs. 8 oz.
	5/8	8 lbs. 2 oz.
	3/4	9 lbs. 12 oz.
	7/8	11 lbs. 6 oz.
	1	13 lbs. 0 oz.
	1 1/4	16 lbs. 4 oz.
	1 1/2	20 lbs. 0 oz.

PITTSBURGH PLATE GLASS COMPANY

LOCATION AND ADDRESSES OF PITTSBURGH PLATE GLASS COMPANY'S WAREHOUSES

AKRON, OHIO	101 Lincoln Street
ALBANY, N. Y.	North Ferry Street, East of Broadway
ATLANTA, GA.	56-60 West Alabama Street
BALTIMORE, MD.	8-12 South Paca Street
BIRMINGHAM, ALA.	Second and 29th Streets
BOSTON, MASS.	99-103 Portland Street
BROOKLYN, N. Y.	Third Avenue and Dean Street
BUFFALO, N. Y.	101-107 Seneca Street
CHICAGO, ILL.	431-451 St. Clair Street
CINCINNATI, OHIO	Broadway, Court Street and Eggleston Avenue
CLEVELAND, OHIO	3849 Hamilton Avenue
COLUMBUS, OHIO	133-135 East Spring Street
DALLAS, TEXAS	Pearl Street and Pacific Avenue
DAVENPORT, IOWA	414-428 Scott Street
DENVER, COLO.	Twenty-sixth and Blake Streets
DES MOINES, IOWA	108 East Fourth Street
DETROIT, MICH.	Hamilton and Holden Avenues
FT. WORTH, TEXAS	1105-1107 Calhoun Street
GRAND RAPIDS, MICH.	21-23 Ionia Avenue, S. W.
HIGH POINT, N. C.	431 Hamilton Avenue
HOUSTON, TEXAS	Crawford and Commerce Streets
INDIANAPOLIS, IND.	1915 Madison Avenue
JACKSONVILLE, FLA.	1530 Enterprise Street
KANSAS CITY, MO.	Fifth and Wyandotte Streets
LONG ISLAND CITY, N. Y.	193-219 Hunters Point Avenue
MEMPHIS, TENN.	181-185 Madison Avenue
MILWAUKEE, WIS.	486-496 Market Street
MINNEAPOLIS, MINN.	616-628 South Third Street
NEWARK, N. J.	Elizabeth Avenue and Peddie Street
NEW HAVEN, CONN.	184 Brewery Street
NEW ORLEANS, LA.	Girod and Commerce Streets
OKLAHOMA CITY, OKLA.	116-118 East Grand Avenue
OMAHA, NEBR.	Fourteenth and Jones Streets
PHILADELPHIA, PA.	Arch and Eleventh Streets
PITTSBURGH, PA.	632-642 Duquesne Way
ROCHESTER, N. Y.	149-153 State Street
SAN ANTONIO, TEXAS	1420-1426 South Alamo Street
SAVANNAH, GA.	731-733 Wheaton Street
ST. LOUIS, MO.	Tenth and Spruce Streets
ST. PAUL, MINN.	459-461 Jackson Street
TOLEDO, OHIO	2410-2416 Albion Street
WASHINGTON, D. C.	Fourth and Channing Streets, N. E.

THE MANUFACTURE OF PAINT



THE ORIGINAL PAINT MAKER



THE ORIGIN AND FIRST USE OF PAINT

PAINT was used first, in the palæolithic age, for pictorial purposes. This was long before historic times—probably not less than fifty thousand years ago. The records on which modern historical theory is based were gathered in connection with discoveries made in France, Spain, and Italy. Other evidence of prehistoric paint-making has been found among ruins in Arizona and Mexico, but few deductions have been drawn from these specimens, as history has no record of the mysterious races who inhabited those regions.

In 1879 a Spaniard living at Altamira was exploring a cave on his estate when his little daughter discovered under a low shelving rock, not readily accessible to an adult, a series of drawings of prehistoric animals painted on the stone ceiling of the cave. Science connects these with the animals which roamed over Europe during the Stone Age, and it is probable that these drawings were made during that period.

These pictures were painted in three colors: red, black, and yellow—pigments that must have been made from earths and char-

coal. In a certain stratum of earth, which has been identified as the surface soil during the Stone Age, there is a quantity of yellow and red ochre. The black pigment might have come from ashes or from a black earth.

The prehistoric artist, by thus mixing ochre, red or yellow, with water, was able to make a practicable paint for his purpose.

Other paintings similar in nature to those in Spain were discovered in 1881 in a cave at Pair-non-Pair, Gironde, France; also in the Cave of Gourdan, Haute-Garonne, France. All these caves were sealed, until their discovery during the Nineteenth Century, with layers of earth and gravel, which undoubtedly is what has preserved the paintings until the present time. Those that have been exposed to the atmosphere show the destructive effect of dampness on the coloring.

Paintings representing prehistoric animals and, in a few instances, pictures of prehistoric men, have been found at Oued Salsaf, in Algeria. Apparently these were done with a sort of red dye, probably obtained from the juice of a berry.

In America also, drawings have been

found, in rock shelters and in caves, which were made in practically the same manner as those in Spain and France, by mixing with water the yellow and red ochre obtained from the soil. It was even possible to obtain a green whenever "terre verte" (glauconite), a colored earth, was to be found.

Worthy of note is the fact that the colored powders from which this primitive paint was made were kept in tubes, much as tubes are used for paints today. The palæolithic tubes were made from horn or bone hollowed out.

Paint is known to have been used by the Egyptians as early as 8000 B.C. Coming down to a much later age, we find that by 3500 B.C. painting had attained the dignity of an art, and numerous colors were in use. Most of these colors were easily manufactured from earthy materials found at that time in Egypt and the surrounding territory. Palettes of slate also were in use among the Egyptians, as well as "mullers" for smoothing down the paint after it had been applied.

Paint-making in early Egypt made its first notable advance through an allied art, when it was found that potter's clay changed color in the process of baking. Through this discovery, in addition to the reds and yellows made by mixing crude ochre with water, the Egyptian artists found themselves able to make green, blue, and black by grinding up pottery that had cracked in the fire, taking the glaze put on by heat, and mixing it with water to obtain new colors.

Black was obtained in other ways: Lampblack was just as common then as now, and the mixing of a little gum arabic with the water caused the particles of lampblack to remain suspended in the liquid, thus forming a

very good paint. The Egyptians found also that it was possible to produce a black powder for coloring matter by charring and grinding young vines and peach stones. White paint was made in much the same manner, using chalk instead of lampblack.

One of the most interesting colors used in the ancient world was "azurite," or ultramarine blue. This is a delicate and beautiful blue, as much prized today as it was in the earliest history of painting. It was made by breaking up lapis lazuli into small fragments, then separating the chips and grains of blue color that appear in the rock, grinding them to a powder, and sifting to obtain the pure coloring matter. This material, suspended in a medium consisting of water and gum arabic, or occasionally of water and the white of egg, produced a blue paint unrivaled in its delicacy of color. Although ultramarine is manufactured today by chemical processes, modern artists sometimes prefer the old-time color because of its superior quality. Painters of the Italian Renaissance made extensive use of "azurite," and had it prepared in a very careful manner in their workshops. According to one of the early Italian artists, it was found wise to permit only old women to work on the making of paint from lapis lazuli because of their great patience and care in handling the material.

Another interesting color was murex, or the royal purple of Tyre. The color derived its name from that of the small fish from which it was obtained. In the waters of the Mediterranean off Phœnicia these tiny fishes abounded. Within the head of the fish was found a secretion that could be converted into this wonderful dye.

THE ORIGIN AND FIRST USE OF PAINT

At one time murex was largely manufactured and used throughout the ancient world. Besides being a beautiful color, it had remarkable preservative properties. It was not purple as we understand that color today, but a rich, heavy crimson, that came to be used everywhere as the color of royalty. The "purple and fine linen" mentioned in the Bible refers to murex, and indicates the value it had for the people of those days. The secret of making Tyrian purple died with the vanishing of the Phœnician race.

Before 1500 B.C. the art of painting had come to be fairly well developed in Crete. In the unearthed remains of the Palace of Cnossus, as well as in the Labyrinth built to house the Minotaur, are to be seen today examples of the art of painting as practiced by the Cretans. The colors they used were practically the same as those found in Egypt in that period, and most of them might well have been obtained from that country, since they made use of a color known as "blue frit," manufactured only along the Nile, by grinding up pottery that had been fire-coated with a copper glaze. One pigment, however, a deep, perfect black, was the Cretans' very own, and rendered their paintings distinctive; it seems to have been made from carbon. This black can be seen in frequent and highly effective use on remnants of ancient Cretan pottery. Many years later it was imitated with much success in the wall frescoes of Pompeii. The Cretan artists made their white from lime, probably obtained from marble. Marble was widely used in the architecture of ancient Crete and Greece.

At the same time, 1500 B.C., painting

had reached an advanced stage in Egypt. By that time the Egyptian artists had increased the number and variety of their colors almost to equal those of the present day. About that period, several colors were imported from India, of which madder was one and indigo another. From the madder root they were able to make the paint known to artists as madder lake, besides other "lakes" from other sources; in like manner various shades of red, violet, and brown also were derived from madder.

Egypt not only made great strides in the discovery, manufacture, and use of colors, but about 1000 B.C. the Egyptians developed another material which added immeasurably to the value and permanence of their art. This was varnish. The acacia tree grew in abundance in Egypt and from its sap, gum arabic was made. Trees growing in the Libyan forests gave forth resin and this resin was used extensively in the manufacture of varnish. Beeswax also came to be used as a varnish, and, mixed with dyes, was used likewise in pictorial art.

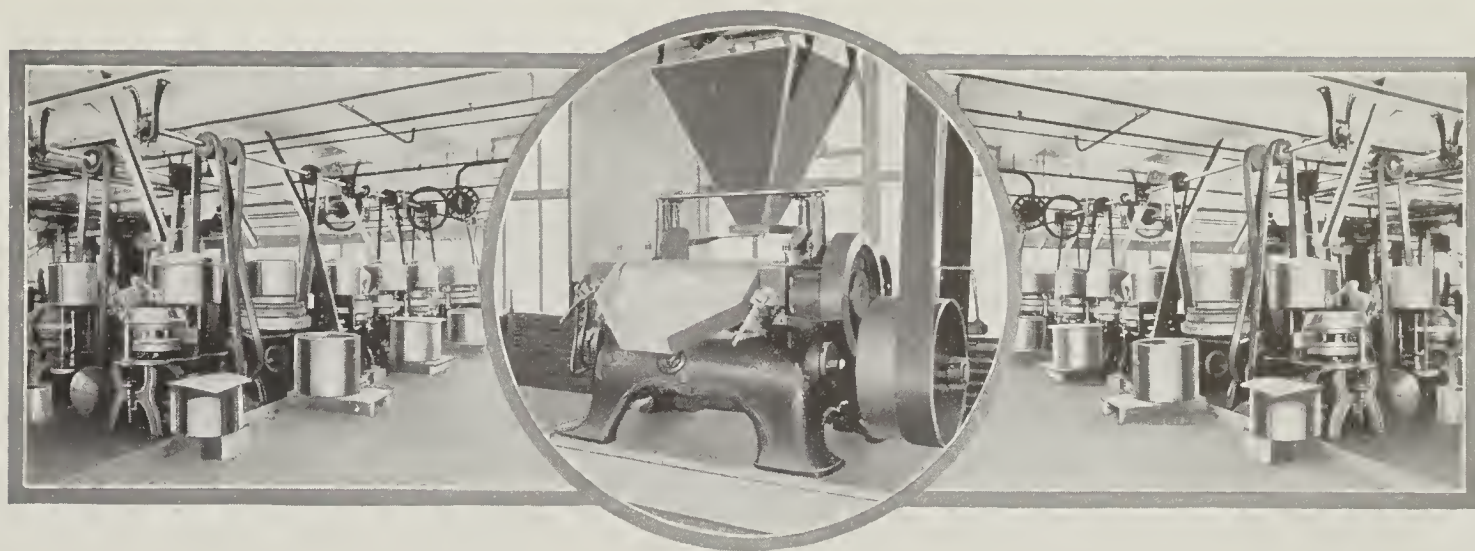
The paintings in Egyptian palaces and tombs, and on coffins and mummies, invariably were protected with varnish. This has preserved the paintings to this day, especially in cases where sepulchres and galleries were choked with the sand of the Sahara so that the outer air could not come in contact with and affect the decorations. The strength and permanence of the Egyptian colors and varnishes have made it possible for us to know and study the civilization of the Nile; the history of Egypt is written in its art. From Egypt the Romans learned much of what they knew of painting. With

few exceptions the Roman artists made use of the same colors, produced by the same methods used by the Egyptians. Relics of classical Roman art were discovered when Pompeii was unearthed in the Eighteenth and Nineteenth Centuries.

Still later, the same methods and materials were employed by the early Italian artists. Before the Renaissance, however, the Italians developed new colors and abandoned some of the primitive Roman pigments, so that when the great artists of Italy appeared, they were able to use tempera and oils in much

the same way these two media of art are used today. The paints were prepared with the greatest of care, and the varnishes and oils used in the mixing of colors received equal attention. Some of the materials that the Egyptians used, indeed, have not been superseded even in the modern composition of coloring material. Linseed oil was used then as it is today; a color similar to cochineal was obtained from a small tree insect; in fact, there are many points of identity in composition between ancient paints and varnishes and like materials of the present day.





PROGRESS AND DEVELOPMENT IN THE MANUFACTURE OF PAINT

P AINT has been defined as: "Any liquid or semi-liquid substance applied to any metallic, wooden, or other surface to protect it from corrosion or decay, or to give color or gloss, or both these qualities, to it."

Speaking more explicitly, paint is a mixture of opaque or semi-opaque substances (pigments) with liquids, which may be applied to surfaces by means of a brush, or a painting machine, or by dipping, and which has the property of forming an adherent coating thereon.

In analyzing the development of paints from the earliest times, what strikes one most forcibly is the dominating position that certain materials have maintained up to the present time. Among these may be mentioned iron oxide, sienna, umber, ochre, white lead, and linseed oil. A superficial investigation might lead to the conclusion that the art of paint-making has not kept pace with modern progress, but further study shows the fallacy of this conclusion.

The nature of paint is such as to necessitate conservative development and the tendency at times has been toward ultra-conservatism. Decisive results to be secured by using new materials can be determined only after years of careful test and observation. So many extraneous influences affect a paint's value in use that favorable laboratory determinations are not conclusive criteria of merit. Consequently paint-users

and paint-makers have been slow to discard materials the utility of which has been established. Notwithstanding these conditions, distinct progress has been made in the paint industry and in painting methods, particularly since the beginning of the present century, and the prospects are that this development will proceed very rapidly.

It is interesting to note that the essential operations of early paint manufacture continue to this day. The ancient paint-maker ground his pigment between stones which he operated by hand; today the pigment is ground between stones, but they are power-driven. The ancient workman mixed his batch in a crude bowl with a wooden spatula; modern mixing is done in huge vats, in which the mixing paddles are operated by power. The ancient workman had only a few pigments, which he generally mixed with water; modern methods involve the use of a varied list of products, whose sources of supply are as widely separated as Canada and the Argentine, India, China, Russia, and the United States. In the gathering of the raw materials used in the manufacture of paint all races and nationalities are employed, and operations ranging from the simplest and most elementary to the most scientific and complex have their part in the process.

A review of the development of paint should cover the entire range of products. Although

PITTSBURGH PLATE GLASS COMPANY



A Section of the Paint Laboratories

The research and test work done in the experimental department of the Paint and Varnish Division of the Pittsburgh Plate Glass Company is the first and most important step in the process of manufacture. Here samples of raw material from all over the world are assembled for examination and analysis. Absolute certainty is the only accepted basis and this is insured by the one infallible, though painstaking and even tedious method—actual test.

white is the main base for general exterior paints, colors play an important part. During the last twenty years the development in colors has been rapid and while many that have been staple articles for centuries are still used, remarkable progress has been made, particularly in the development of permanent reds.

The years since 1914 mark an epoch in the development of the American paint industry. During that time this country has thrown off entirely its dependence on Europe for the raw materials necessary in the manufacture of artificial colors, and now is able to produce everything necessary to the manufacture of paint from basic materials found or fabricated in the United States. At the same time there has been striking improvement in metallic pigments, such as oxide of iron. Today, for example, there is produced a pure yellow oxide with the color of ochre, but more highly concentrated.

The white pigments used in paint manufacture may be divided into two classes—those which

are highly opaque when mixed in oils and those which have but little hiding power. To the former class belong white lead, both basic carbonate and sulphate, zinc oxide, leaded zinc, lithopone, and titanium white. In the other class would be included whiting, gypsum, barytes, silica, China clay, asbestine, and talc.

White lead is the oldest white pigment known and is mentioned in literature as early as 430 B.C. Records seem to indicate that this material was made by a process not widely different from the present-day Old Dutch Process, the method now most widely used. The basic sulphate of lead dates only from 1872. It is now generally accepted as equal to white lead for most purposes, and superior to it for painting steel structures. Blue lead, produced by a similar method, also has obtained recognition for the painting of structural iron and steel.

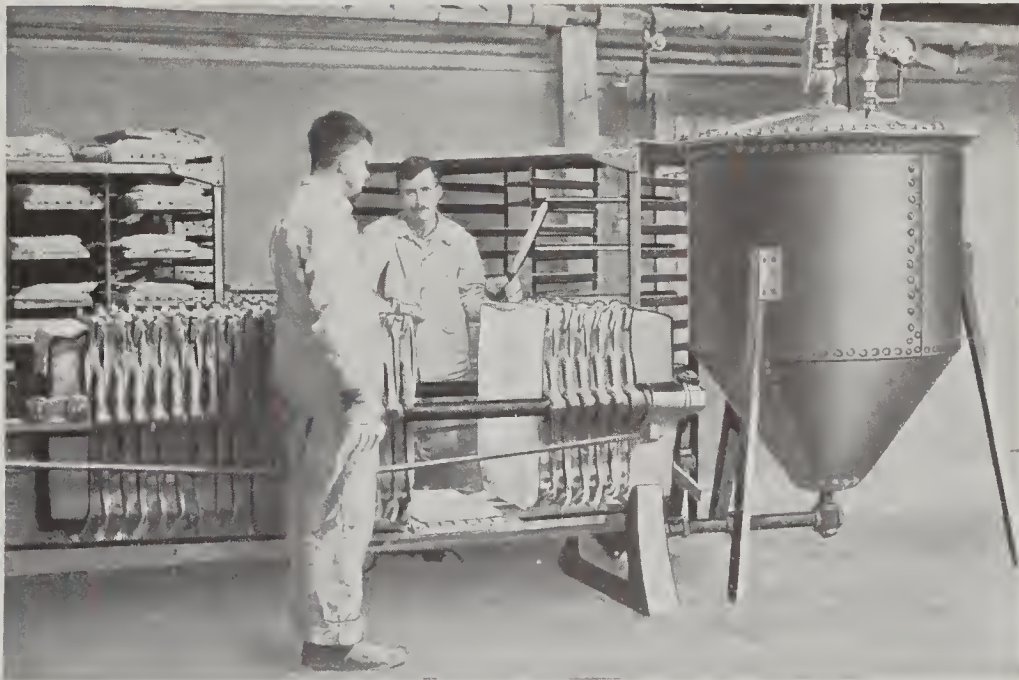
There is but little difference in the physical properties of leads produced by the various methods. The outstanding virtue of lead as a

THE MANUFACTURE OF PAINT



A Row of Dry-Color Tanks

The raw materials from which colors are made are dissolved in these tubs. The solutions, when brought together in larger tubs, precipitate the insoluble colors. The liquid containing the by-products is siphoned off, the color is washed with water, and then it is transferred to the color presses shown in the picture below.



Dry-Color Press

Here the water is pressed from the solids and the material is moulded into cakes, which are dried and ground into powders commercially known as dry colors.



Paint and Varnish Plants at Newark, New Jersey

Paint and Varnish Plant



Milwaukee, Wisconsin

Linseed Oil Plant at Red Wing, Minnesota



A Row of Mixers

Here is illustrated the type of machine used in mixing the pigment with liquid to form a paste. This then is ground between two stones which reduce the pigment particles to extreme fineness. Various types of mills are used for this purpose.

paint material is that, while it has a drying effect on oil, it produces a film which never becomes brittle, but instead chalks and checks, though it does not peel. Consequently it is of value for use in combination with zinc oxide to offset the extreme hardness of that pigment. Although chalking is advantageous from a repainting standpoint, it causes tints made with white lead to appear faded soon after application and long before there is any great actual deterioration in the protective quality of the paint-film.

Zinc oxide has been made commercially for at least one hundred and twenty-five years. It is now generally used in prepared paints. Because it produces a smooth, uniform texture, it is admirably fitted for use in enamels.

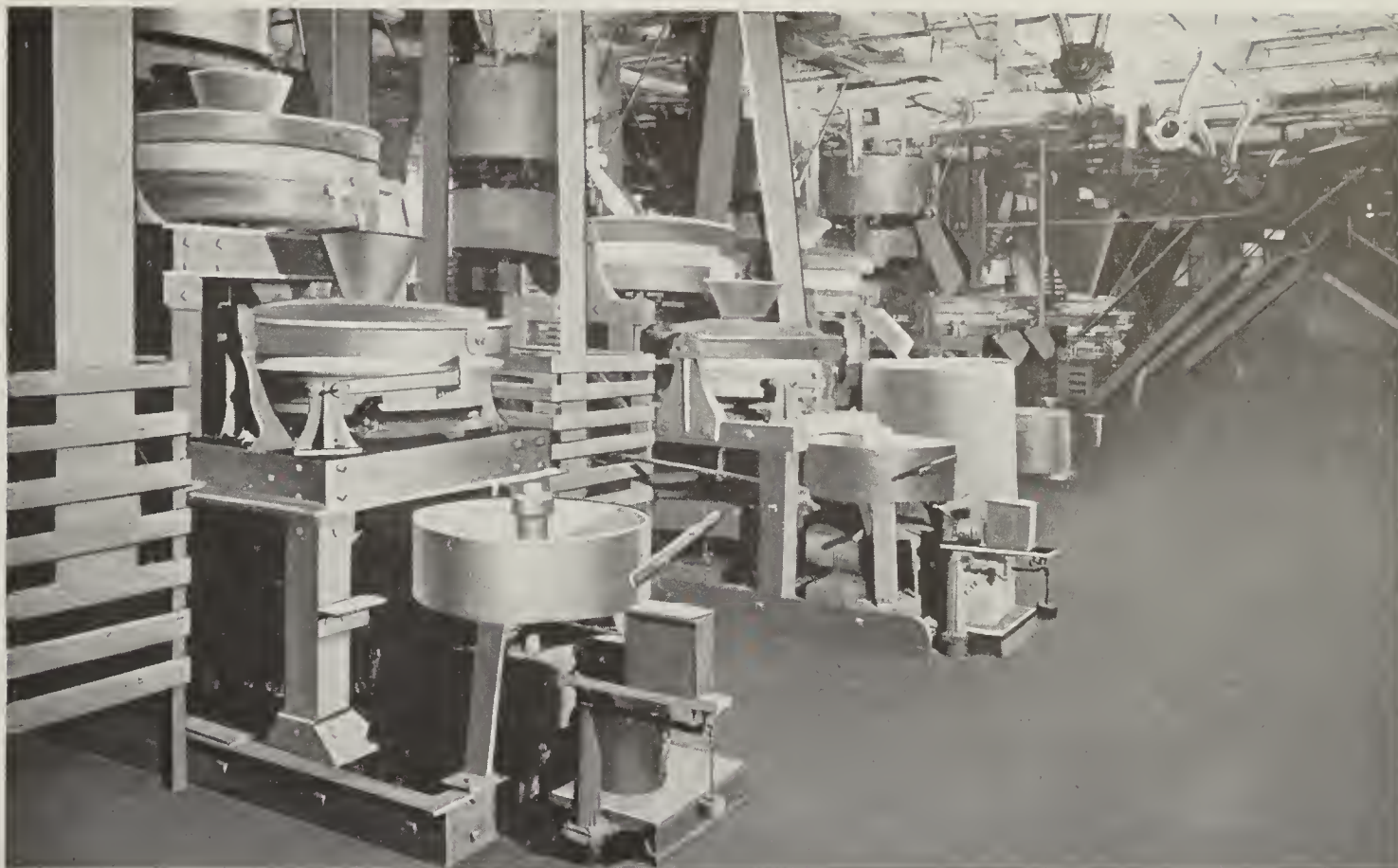
Lithopone is a pigment which has made remarkable strides as a paint ingredient. The discovery is credited to Orr, an Englishman, in the year 1874. This pigment is whiter than lead, and in texture it is more like white lead than zinc oxide, the smoothness of which it lacks. Its color is unaffected by sulphur or hydrogen

sulphide, owing to the fact that it is already a sulphide and sulphate combination. Lithopone is largely used for the manufacture of interior flat wall paints. It is now recognized as one of the major white pigments.

Titanium white is the newest of the white pigments and bids fair to become an important member of the major or opaque-white group.

The white pigments in the second class are generally described as inert. Inert pigments have no chemical action, and although white when dry, usually lose their opacity when mixed with oil, though retaining it when mixed with water in the form of cold-water paints. They are derived from many sources and produced by various methods. For example, barytes, or barite, is a mineral found in large quantities in Missouri, Tennessee, and North Carolina. Gypsum is a natural sulphate of lime. Whiting is produced by grinding English cliff stone. Silica occurs in the natural state as quartz crystals and has been found far superior to any other inert material for the protection of structural

THE MANUFACTURE OF PAINT



A Battery of Double Grinding Mills

When extreme fineness is essential, the pigment is ground in a double-grinding type of mill illustrated above. After passing through one set of grinding stones the pigment drops to another set, where it is ground again.

iron. Other inert pigments used in the paint industry are the silicates, asbestine and talc. Before the grinding which fits them for use in paint-making, these bulky, stone-like materials are somewhat similar in appearance.

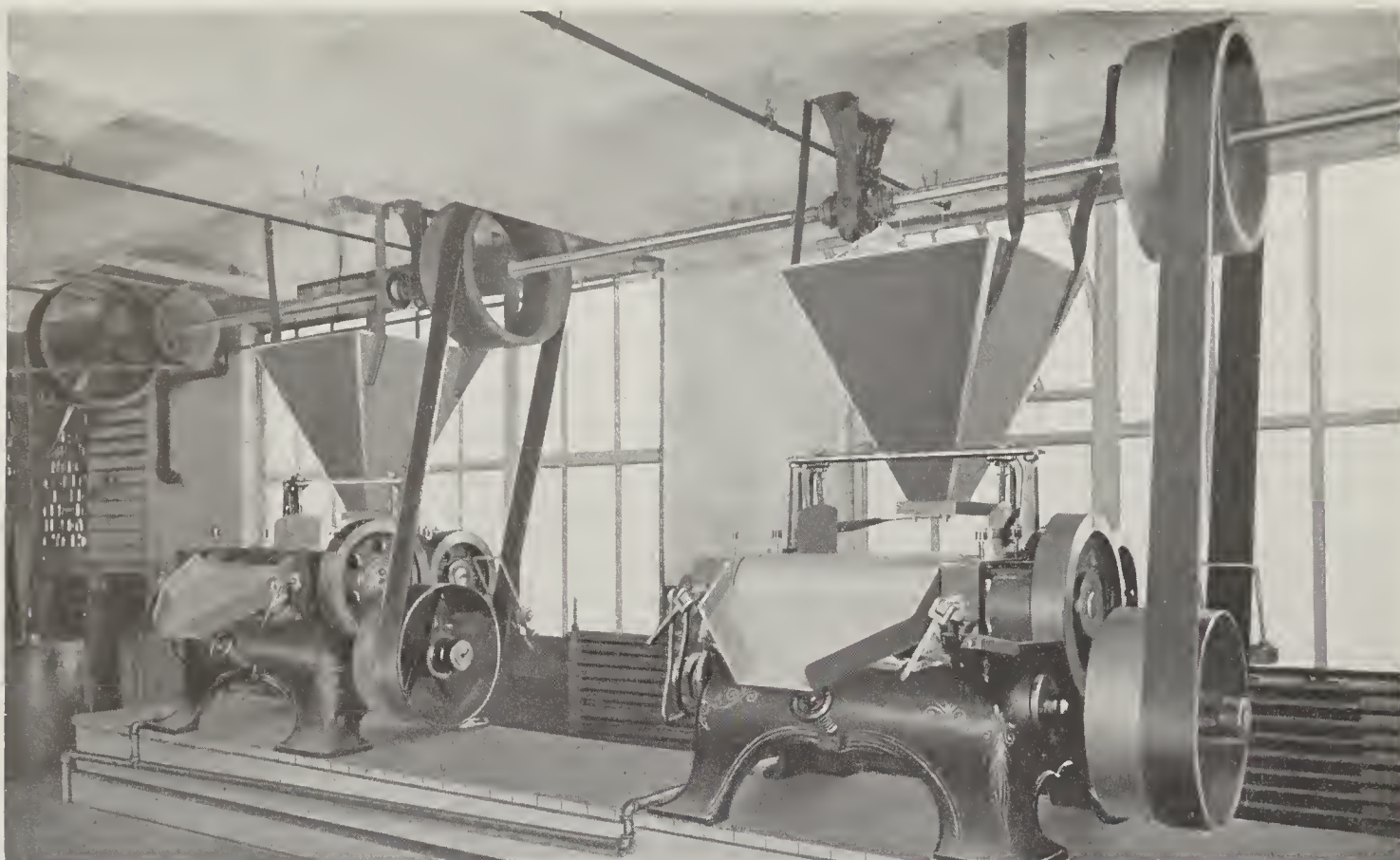
Inert materials have a well-defined use in paint manufacture. It is only their abuse that is open to criticism. Indeed, many colors are so strong that to use them without inert pigments would be an extravagance. A proper proportion of inert pigment adds to the durability of painting materials for exterior use. Some of these inert pigments are extraordinarily resistant to atmospheric influences, far superior to lead and zinc in this respect, and are deficient only in hiding power. Therefore, when properly used, they offer a distinct protective value, and, having no chemical activity, reinforce the chemically active, opaque pigments.

In addition to the white pigments, the paint manufacturer has to deal with another group, usually included under the designation, colored pigments. These may be divided roughly into

four classes: those containing lead, those containing iron, those containing carbon, and those containing organic colors. Among the pigments containing lead are chrome yellow, chrome orange, red lead, orange mineral, and chrome green. Pigments containing iron include ochres, umbers, siennas, Venetian reds, Indian red, crimson oxide, and black oxide. Chinese blue, as it contains some iron, may be included in this class, although it is entirely different in nature from the foregoing pigments. Pigments containing carbon include lampblack, charcoal black, bone black, and graphite.

The organic colors, used either alone or in combination with mineral pigment, are of diverse origin. Some, such as carmine, produced from the cochineal insect, are of animal derivation, while others, like Dutch pink (which, oddly enough, is a yellow, produced from quercitron bark), are of vegetable origin. Still other organic colors, usually grouped under the term "coal-tar products," owe their elaboration to the processes of modern chemistry. In this

PITTSBURGH PLATE GLASS COMPANY



A Special Roller Grinding Mill

Here is shown the latest type of mill. In this mill the pigment is passed between heavy steel rollers. This modern roller mill has several times the capacity of the older type of stone mill.



The Stone-Dresser

The stone-dresser plays an important part in paint-making. In the stone-type mill, much depends upon the way in which the cutting edges of the stones are shaped. Long experience makes the stone-dresser an adept and in recent years the automatic hammer has lightened his task considerably.

latter class are included: alizarine, which, combined with iron oxide, produces the permanent Tuscan reds; eosine, used extensively in the past with orange mineral to make vermilion shades; and Para red, used alone or in conjunction with orange mineral.

There are several miscellaneous pigments, namely: Prussian blue, Chinese blue, emerald green, genuine cobalt blue, zinc chromate, and chrome oxide.

Prussian and Chinese blue, although containing iron as an important constituent, are generally classed as cyanide compounds, and are the only miscellaneous pigments of those just mentioned which are used to any extent in the manufacture of paints.

The development of oils has kept pace with the improvement in pigments. For many years practically the only oil used as a vehicle for paints was linseed oil, obtained by crushing the seed of flax. Flax was cultivated, until about 1850, chiefly for the fiber, the seed being a by-product. This condition has been completely reversed and the seed now is by far the chief object

THE MANUFACTURE OF PAINT



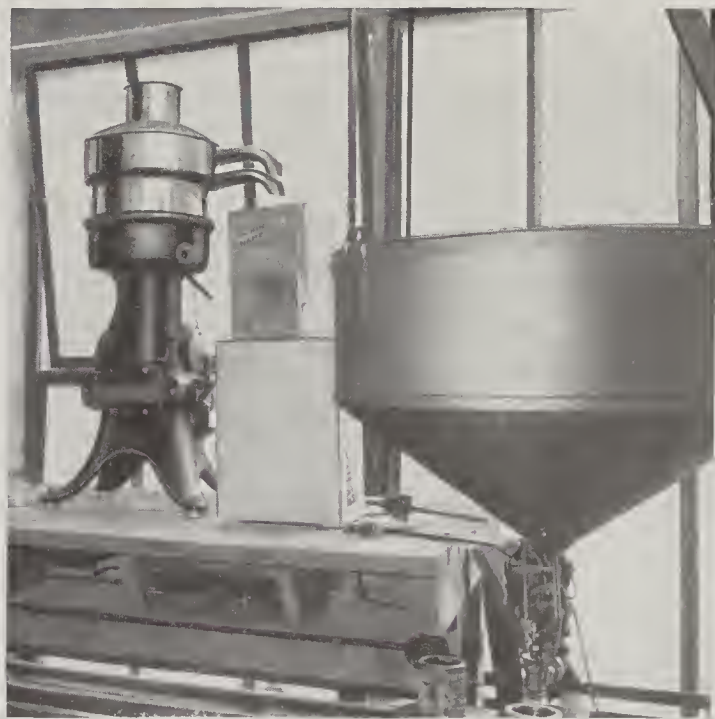
A Battery of Enamel Mills

Special care is necessary in the manufacture of enamels. The mills in which enamels are made are of a smaller type than the regular paint mill and are carefully watched over by expert supervisors who see that the proper degree of fineness in grinding is obtained.

in its cultivation. Flaxseed is grown principally in India, Russia, Argentine Republic, the United States, and Canada.

The first new oil of any importance to be introduced was China wood oil and for some time its use was confined to the manufacture of varnish. With the proper treatment it had the valuable property of adding hardness, toughness, and gloss to a finish. Its use made possible the production of cheaper varnishes, comparing favorably in durability with those formerly made from the hard gums, which are gradually becoming scarce and consequently more expensive. In the course of time China wood oil was introduced into flat interior and to some extent flat exterior paints, with the result that these paints are more durable, brush more easily, and are more resistant to moisture.

During recent years there have been developed a number of oriental oils, of which soya bean and Perilla oils have been used to a considerable extent. Having valuable special properties, both no doubt will continue to hold prominent place in the manufacture of paint products.



Enamel Clarifier

All enamels are run through a separator operating on exactly the same principle as an ordinary cream separator. The rapid rotary motion forces the coarser particles toward the outside, so that the enamel remaining is impalpably fine.

PITTSBURGH PLATE GLASS COMPANY



Gravity Paint Fillers

By filling from an overhead hopper, the force of gravity is utilized. In the lower picture is shown the use of the automatic cut-off and the method of filling by weight and measure. As a given quantity of paint flows through the filling spigot, a valve closes automatically, cutting off the flow. The can rests on a scale which has been set at the standard weight for the kind of paint and the size of container. It is interesting and indeed fascinating to watch as the can rapidly fills, and then, as the proper quantity is metered, to hear the click of the valve as the apparatus registers exact weight and measure.



Filling by Weight and Measure

The third important group of materials used in the manufacture of paints and varnishes is known as the volatile thinners. The principal natural product in this classification is turpentine, obtained by the distillation of pine resin. Turpentine is the best known solvent for oils and gums. Its flash-point is 95 degrees Fahrenheit, which means that a flame passed over it at an ordinary temperature will not cause it to ignite. When spread out in a thin film it evaporates entirely, but when allowed to evaporate from a container, oxidation takes place and a residue remains.

Another source of thinner is petroleum. The petroleum derivative most used is commonly known as painters' naphtha. Benzole and solvent naphtha are distillates from coal tar. Benzole is much more volatile than solvent naphtha.

Many excellent turpentine substitutes are produced by properly fractioning the different petroleum products and incorporating other materials.

THE MANUFACTURE OF PAINT



Sample and Test Room

The finished product is subjected to a final test in the sample room. A sample is tested for color, consistency, and covering capacity. For checking each step in this operation a standard sample is kept, and as the various batches come through the factory they are tested and results checked against the standard sample. Special samples also are worked out in this room. Many finishing materials now in daily use by leading manufacturers in all parts of the country were first worked out in this miniature paint factory.

These products, on evaporation, leave nothing behind them in the film. They are added to paint for the purpose of making it spread farther and obtaining a film of the proper thinness. Therefore, the preference is for the one which is most economical and at the same time answers the purpose.

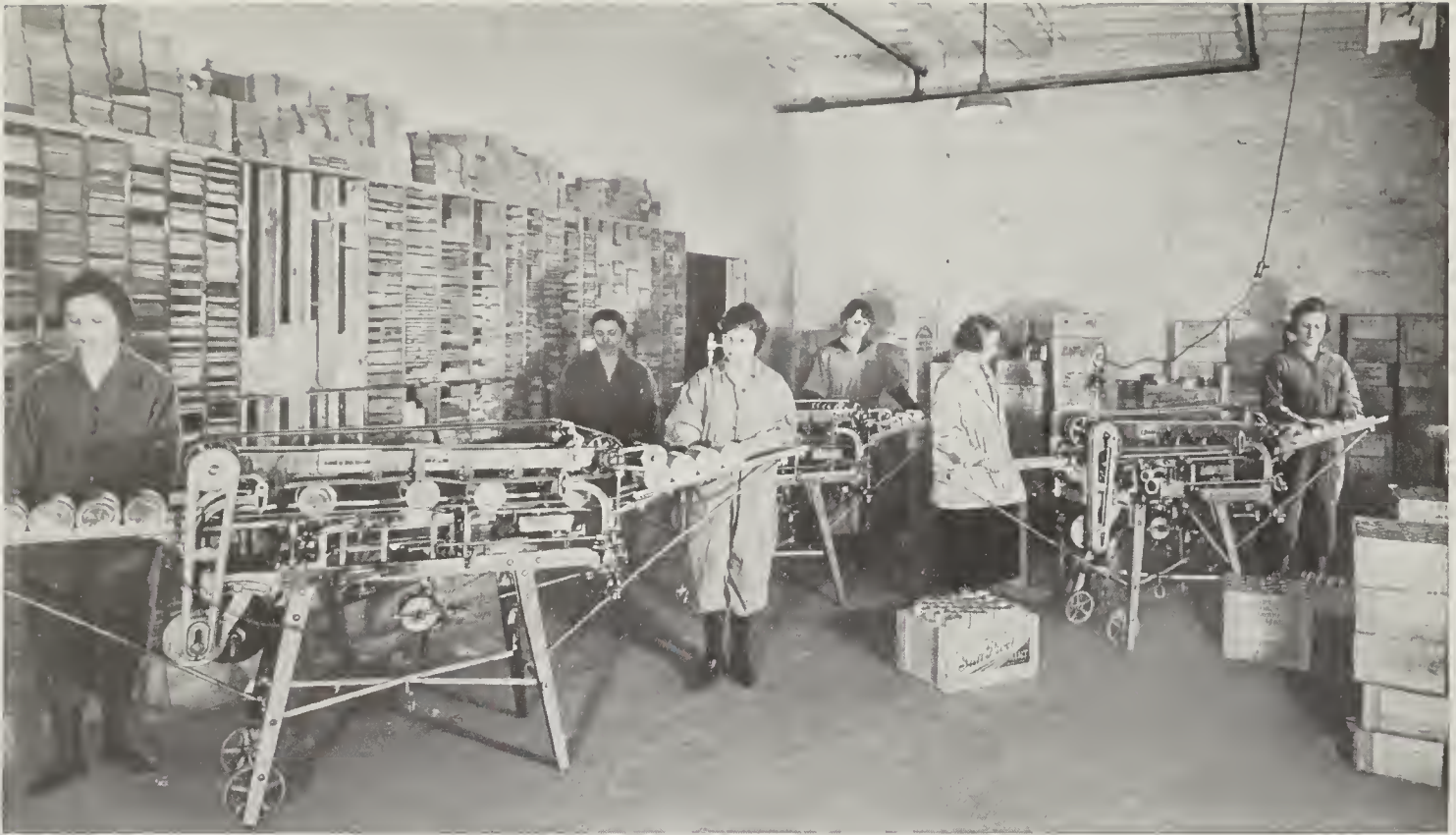
Important improvements have been made in the manufacture of undercoaters and white enamels. In the former the use of lithopone has been an important factor. Through a manipulation of the vehicle, it has been possible to make an undercoater which can be flowed on, just as enamels are, thus eliminating the brush marks common to the ordinary untreated oil film. This greatly improves the ground coat and makes possible a high-grade job with fewer coats of the higher-priced enamel.

Until recent years the trade depended on enamels produced largely from damar varnish, made by dissolving damar gum in turpentine or some other volatile thinner. Enamels made



Test Panels

The roofs of our paint factories afford ideal facilities for the testing of paints and pigments under various conditions which are encountered in the application of paints. Numerous panels are continually on test and the results of the combination of various pigments and oils are carefully noted.



A Battery of Labeling Machines

A very important operation is the labeling of cans. There are many different lines of paint—exterior and interior; for wood, iron, and concrete; gloss and flat; liquid, paste, and semi-paste; each line is made in many colors, each color is put up in various sizes, and each requires its separate label. The labels are affixed by automatic machines, as illustrated in these pictures, and a battery of these machines will label many thousands of cans daily.



A Special Type of Machine Used in Labeling Gallon Cans

from damar, however, soon lose their elasticity and in course of time are sure to crack and check. These enamels possess only one valuable property, and that is their whiteness, which is maintained in a satisfactory manner. Against this single advantage must be set off their lack of durability, difficulty in brushing, and a tendency to soften when repainted, causing checking of coats applied over them later.

The development of oil-base enamels has overcome all these difficulties without the sacrifice of any important advantages, and marks a notable forward step in the industry.

Future progress doubtless will be along the line of improving the vehicle for exterior paints. The knowledge already gained about oils and how to treat them will be of great assistance in developing this class of paint materials. Past experimentation and exhaustive testing form a solid foundation on which to build for future progress, and it is entirely reasonable to predict that the developments of the next decade will greatly surpass those of the past quarter of a century, fruitful as that period has been.

THE MANUFACTURE OF VARNISH



Storage and Aging Tanks



THE MANUFACTURE OF VARNISH

THE word Varnish is derived from the name of Berenice, Queen of Cyrene, beautiful wife of Ptolemy Euergetes, King of Egypt about 250 B.C. She is said to have sacrificed her wonderful hair in the temple of Venus in fulfilment of a vow for her husband's safe return from a campaign in Asia. Her hair disappeared mysteriously from the altar, and was reported by the astronomer Conon to have appeared as a constellation in the Milky Way. Amber later was likened by the Greeks to Berenice's hair and called by her name. Hence the late-Latin word *vernix* and its later Italian form *vernice*, from which our word Varnish is derived.

Only a few decades ago varnish-making was a well-nigh occult art. The formulas and rule-of-thumb methods used by the various manufacturers were guarded jealously. Then the chemist entered the field. Exhaustive study of the needs of the varnish consumer, analysis of the raw materials, and constant experimenting soon enabled him to make a variety of varnishes exactly suited for the purposes required.

The materials used in the making of varnish are drawn from all sections of the globe.

Of first importance are the resins, or fossil gums, which give to varnish its brilliance and lustre. These now have come to be classed under the general term copal, a designation originally applied only to resins from East Africa. Copals result from the exudation of the sap of pre-historic trees which became covered with soil and later fossilized. These gums have remained

imbedded in the ground for many centuries and now are brought to the surface for use in the making of varnish.

In the early days gum-digging was carried on in a very haphazard fashion and because of the crude methods used, not much more than the surface gum ever was recovered. The gum was located by prodding into the ground with long, sharp steel rods, and the deposits were then dug up, scraped, cleaned, and graded for the market. Today the industry is better organized and the ancient digger with his prodding stick has been replaced by an individual who compares favorably with the American miner. The industry includes a well-ordered system for grading and marketing the gum, with extensive warehouses and brokerage connections in the chief markets of the world.

Deposits of fossil gums are found in Zanzibar, Mozambique, Sierra Leone, Angola, New Zealand, and the Pacific Indies. A vast supply comes from the Philippines, the Sunda Islands, and the Moluccas. Because this gum usually is put aboard ship at Manila it has come to be known as Manila gum.

The resins from Java, Sumatra, and Borneo have been classified as damar gums by European importers, and more recently many resins from India and the Malay Islands have been introduced under the name of damar.

Another source of resin supply is in the distillation of turpentine. The thick, viscous crude turpentine is put into huge stills and all the



Testing Raw Materials

As in the making of paint so is it in the making of varnish: constant testing of raw materials to insure a proper standard of quality is carried on in two modernly equipped chemical laboratories.

volatile matter is driven off and condensed. That which remains in the still is run into barrels while in a molten state, and allowed to harden. This residue is the rosin of commerce.

Gilsonite is used in the manufacture of black air-drying and baking japons, used extensively on ironwork. It is a derivative of a material found largely in Utah and closely allied in characteristics with asphaltum.

These are not all the gums used by the varnish-maker, but the foregoing notes will convey some idea of the variety of materials used in varnish-making and the wide sources of supply from which these materials are obtained.

The oils used in the manufacture of varnish are similar to those used in the making of paint and have been described already in the section devoted to paint. The thinners used also have been covered in the same article. There remain for our consideration, then, only the driers, which are incorporated with the oils to hasten the drying of the varnish film. The terms "japan," "japan drier," and "drier" are used interchangeably and it is rather difficult to make

a hard and fast distinction, but in general, the term "japan" is applied to a quick-drying liquid used alone, or in connection with color, while the terms "japan drier" and "drier" are applied to liquids which are added in small quantities to hasten the drying of varnish, linseed oil, paints, and enamels.

It is most interesting to make close comparison of ancient and modern methods in varnish-making. In a manuscript of the monk Theophilus, written in the Eleventh Century, we find this account of the "Varnish Gluten" of his day:

"Put Linseed Oil into a small new pot and add, very fine powdered, a Gum which is called Fornis, which has the appearance of the most lueid. Thus, but, when broken, it yields a brighter lustre. When you have placed over the fire, cook carefully, so that it may not boil up, until the third part is consumed, and guard against the flame, because it is very dangerous and is extinguished with difficulty if it is raised. Every painting, covered over with this Gluten, is made both beautiful and forever durable.

"Place together four stones which may be able

THE MANUFACTURE OF VARNISH



Melting Varnish Gums

The latest type of "stack room." Formerly draft for the fires was obtained naturally, by means of tall brick chimneys. Now exhaust fans produce forced draft, and the air necessary to combustion is regulated to a nicety.

to sustain the fire without flying to pieces, and place a common pot above them and put into it the above-mentioned Fornis, which in Romaic is called Glassa, and upon the mouth of the pot place a smaller pot which has a small hole in the bottom, and lute a paste about it so that no vapor may come out between these pots. Then place fire carefully underneath until this Gum liquefy; you will also have a thin rod with a handle with which you will stir this Gum, and with which you can feel when it is quite liquid.

"Have also a third pot nigh, placed upon the coals, in which is hot Linseed Oil, and when the Gum is quite liquid, so that the iron being extracted, a kind of thread is drawn out with it, pour the hot Oil into it and stir it with the iron, and this cook together that they boil not violently, and at times draw out the iron and daub over a little piece of wood or stone, to try its substance. And take care this, that in weight there are two parts of Oil and the third part of Gum. And when you have carefully cooked it to your wish, removing it from the fire and uncovering it, allow it to cool."

Now note how closely the present process follows the method of olden days, though exact science now dictates the proportions of ingredients to be used and the kettles and fires are in size many times greater:

The gums are selected according to formula and placed in large copper kettles, which are mounted on three- or four-wheel trucks. Over each kettle is fastened a cover, which is battened down fume-tight. This cover has three small openings, one in the center with a small stack, one on the side which fits the nozzle of a funnel used in adding the oils, and a third through which a stirring-rod can be operated.

The kettle is now wheeled into position over a gas fire fed from four two-inch gas openings. Forced draft is secured by means of electrically-driven fans.

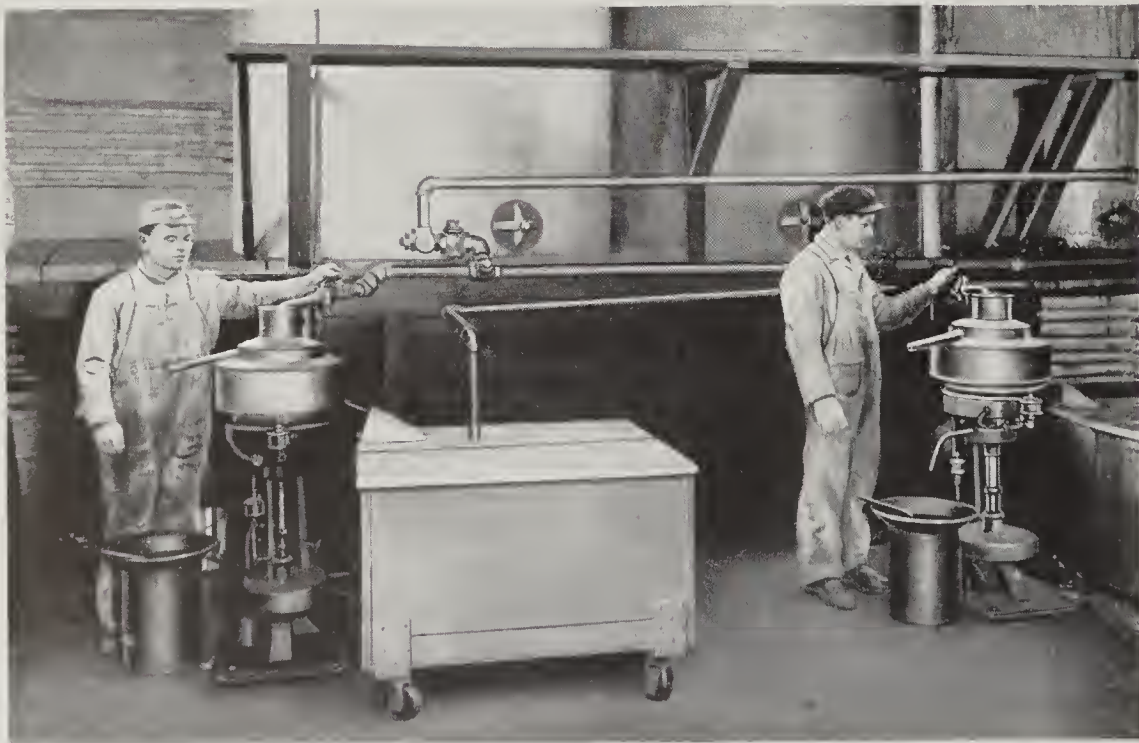
When the cooking process is started, a forced draft draws off the fumes and conducts them through a system of chilled condensing coils, in which they are divested by condensation of all volatile oils and other substances of value before the refuse gases finally are discharged.

PITTSBURGH PLATE GLASS COMPANY



Adding Thinners

Thinners are added to the varnish while it is extremely hot and constant agitation or stirring is necessary throughout the process.



Running Varnish Through the Clarifier

After the varnish is run through this machine, which in appearance and construction is much like a large cream separator, it is absolutely clean, without trace of sediment or impurity of any kind.

THE MANUFACTURE OF VARNISH



Testing the Finished Product

The varnish in its finished state is carefully tested against an established standard.

The gum first softens to a sticky mass and liquefies as the heat becomes more intense. Froth, formed by the continuous evolution of vapors, is beaten down with a large metal stirring-rod. Finally the gum becomes quite fluid. The judgment of the varnish-maker, who observes the drip from the stirring-rod, tells him when the solution is ready for the addition of the oil. The oil usually is pre-heated, so that when added it will not chill the gum sufficiently to cause it to become solid again, but instead the two liquids will go into smooth solution.

An extensive variety of varnishes can be made by changing the operations, the gums, the oils, and the driers used, and also by varying the proportionate quantities of the ingredients. When the gums, oils, and metallic drying salts have been properly combined and thoroughly amalgamated, the temperature of the liquid is from 500 to 700 degrees Fahrenheit. The kettles are rolled into a cooling place and when the heat has been reduced to a point low enough to permit the addition of thinners without flashing, the kettles are run into a thinning room, where

the thinners are added according to formula. The varnish must be agitated constantly while the thinners are being added.

After this the varnish, while still very hot, is pumped into large cooling tanks where it is allowed to stand overnight. Next day, still hot, it is put through a machine which filters the varnish, removing every particle of undissolved gum, dirt, and foreign substance of whatsoever kind. A modern steam-driven turbine separator is used. This operates much like a centrifugal cream-separator, and makes the varnish perfectly clear and transparent.

The varnish is then ready for the aging tanks, where it is properly settled and aged before it is drawn off into shipping containers. Proper aging is essential to final perfection in the highest grades, especially the finishing varnishes. In the lower grades of varnish the aging process is not so necessary, but for a product of supreme excellence, upon which a reputation may be built, there are requisite certain smooth-flowing and free-working qualities which nothing but age can impart.

PITTSBURGH PLATE GLASS COMPANY



Newark Varnish Plant

Paint and Varnish Division, Pittsburgh Plate Glass Company.



Milwaukee Varnish Plant

Paint and Varnish Division, Pittsburgh Plate Glass Company.



THE USE OF COLOR

FOR OUTSIDE WORK

IN THE selection of paints, thought should be given to the permanence of colors. All shades of Patton's Sun-Proof Paints are as unchangeable as the several colors can be made, but certain hues can not be made permanent. They will either darken gradually under the rays of the sun or fade more or less quickly.

The blues, pinks, and delicate tints intended solely for interior-work and so marked on our color cards should never be used where they will be exposed to the sun. The greens of yellowish cast are more fugitive than the darker greens; the former will grow lighter while the latter will darken. The grays, browns, and yellows and the many beautiful shades and tints made from these colors are recommended where permanence of color is especially desirable.

FOR INSIDE WORK

The pleasantness of a room depends almost entirely on the way in which the walls are decorated. According to the best principles of interior decoration, walls must not be considered as decorative objects in themselves; they are considered as backgrounds for the furnishing of the interior, and are to be kept as soft in tone as possible because it is the inconspicuous, subdued walls that give rooms the appearance of greater spaciousness. It is this character of wall that provides the proper background for the furnishings, holding the entire architectural plan of the interior in a harmonious whole. Brilliancy in the interior color-scheme is by all means desirable, but use it in the furnishings—not on the walls. When it comes to selecting colors for wall decoration there is wide opportunity for the expression of individual preference, but the

colors selected should always be of a soft and mellow tone: light cream, ivory, and grays for south rooms, tans and greens for north rooms. The darker, more positive tones are best adapted for use in club rooms, theatres, restaurants, and public buildings, where high ceilings and large rooms make the use of these warmer colors permissible and even desirable.

FOR COMMERCIAL INTERIORS

In the decoration of a commercial interior, the first consideration is light-reflecting value, and there is no paint which better serves this purpose than a pure white. By actual test it has been proved that a white paint reflects from 82 to 89 per cent of the light entering the interior. Some of the very light tints are almost as high in reflecting value: ivory surfaces reflect 73 to 78 per cent of the light, cream from 62 to 80 per cent, yellow from 61 to 75 per cent. These shades, therefore, may be used with safety. Dark shades of green, blue, and red are to be avoided because some of them reflect as little as 11 per cent of the light.

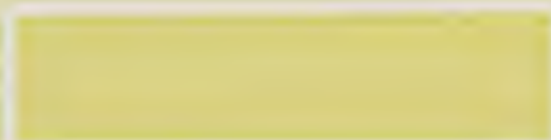
For factories, white paints or the very lightest tints should be selected to obtain the greatest amount of light in the workroom. Surprising savings in factory lighting costs may be effected by choosing paint of the right color.

COLOR REPRODUCTIONS

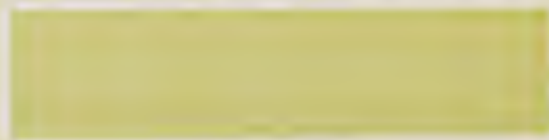
The colors shown on our color cards and reproduced in the pages of this book match as nearly as possible the color of the paint when dry. Color chips, when kept from the light, change their color, the change being more marked in some colors than in others. When the color chips are exposed to light and applied paint is allowed to dry, the paint and sample chips will match.

PATTON'S SUN-PROOF LIQUID PAINT

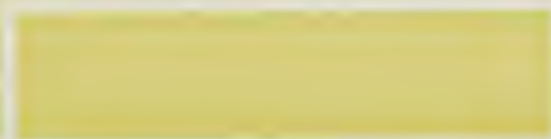
For description, see page 28



JERSEY CREAM 330



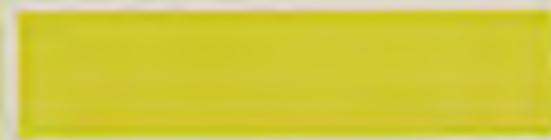
LIGHT STONE 331



MILWAUKEE BRICK 55



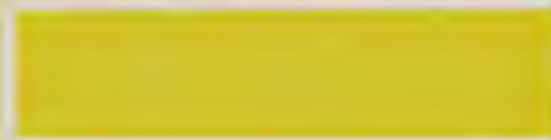
PEARL GRAY 14X



STRAW 173



FRENCH GRAY 302



NAPLES 175



SLATE 310



DEEP BUFF 308



NEUTRAL DRAB 304



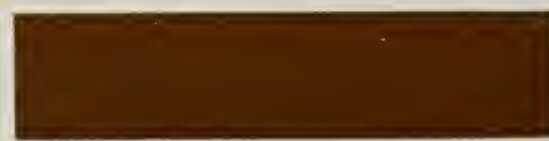
INDIAN TAN J



RUSSIAN GRAY 13X



LEATHER 125



BROWN 306



AMBER BROWN 320



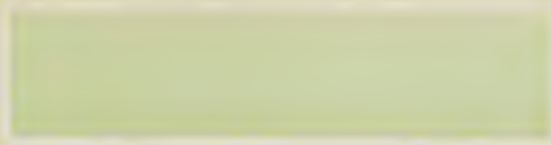
COPPER BROWN 340

ALSO OUTSIDE WHITE, BLACK, INSIDE FLAT, AND GLOSS WHITE

PROOF PRODUCTS

PATTON'S SUN-PROOF LIQUID PAINT

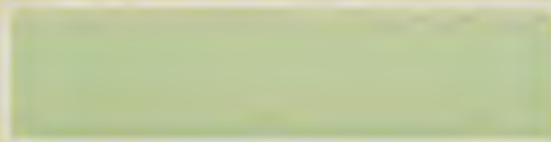
For description, see page 28



SILVER GRAY 332



AZURE 178



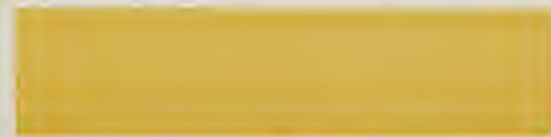
SEA GREEN 334



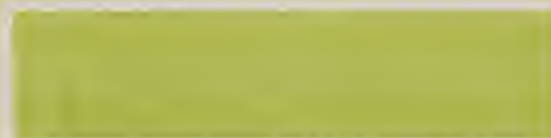
PINK 177



LIGHT OLIVE 12X



LIGHT BUFF 322



APPLE GREEN 148



RICH BUFF 314



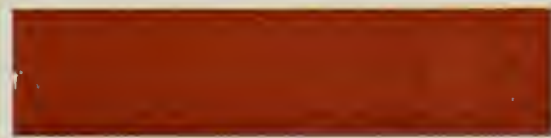
NILE GREEN 149



LIGHT TERRA COTTA 63



WILLOW GREEN 336



BRICK RED 337



COPPER VERDE 341



KENTUCKY BLIND GREEN 338



SASH GREEN 333



WAR TUSCAN W4X



PATTON'S SUN-PROOF LIQUID PAINT

For color chips, see pages 26, 27
For examples of work, see pages.....99 to 103
For specifications for use, see Nos. 1, 2, 3,
18, 19, 20, 21, 24, 25, 38, 39, on pages 82, 84, 86

“SAVE the Surface and You Save All” has deep significance for the property owner. A surface which is not adequately protected by paint becomes the prey of the elements. The fierce summer suns split and warp the boards, moisture enters, rot begins, and thereafter decay is rapid. The life of a building is indefinite if it is properly protected with an armor of paint.

Much depends on the choice of Paint. A few people may be able to judge the value of a paint by its composition, but to the average user the formula on the can means nothing. Paint should be bought on the basis of service. How many square feet will it cover? How many years will it last?

The answers to these two questions will give one the facts necessary to choose paint intelligently.

Low prices in paint should be avoided, for

note this: In a job of painting, 75 per cent of the cost goes into labor and 25 per cent into material. Therefore the paint which for the longest time defers the necessity of repainting is by far the cheapest.

Patton's Sun-Proof Paint resists the action of the sun and atmosphere to an extent which will adequately protect a surface against the elements.

It is made according to a formula which, long usage has proved, produces a tough, durable, wear-resisting paint-film spreading with uniform thickness over the surface to which it is applied.

One gallon of Sun-Proof Paint, when used according to directions, will cover 350 square feet of an average surface on new work, two coats; or 250 square feet, three coats.

Sizes—Barrels; five-gallon, gallon, half-gallon, quart, pint, and half-pint cans.



PATTON'S PORCHITE

For color chips, see page.....30
For examples of work, see page.....31
For specifications for use, see Nos. 4, 5,
on page.....82

THE constant tread of many feet will soon wear away the hardest surfaces. On the porch floors of the home, on the stair-tread, and on the decks of boats, the truth of this statement soon becomes apparent. It is of particular importance that these surfaces be protected. An unpainted surface will quickly deteriorate under the best of conditions; but under abrasion it disintegrates with alarming rapidity.

To give proper service under such severe conditions a Paint is required which will resist mechanical wear, as well as the action of sun, rain, sleet, and snow. An ordinary house paint is not properly compounded to meet these conditions.

Patton's Porchite is intended principally for exterior use where these extreme conditions are encountered. It follows naturally that a paint which will give satisfaction under such conditions can be used satisfactorily for various other exterior purposes also.

The covering capacity of Porchite depends on the condition of the surface to be painted, but as a basis for calculating the quantity required it is safe to estimate approximately 300 to 330 square feet, two coats.

Sizes—Barrels; five-gallon, gallon, half-gallon, and quart cans.



PATTON'S FLORHIDE ENAMEL

For color chips, see page.....30
For specifications for use, see Nos.
16, 17, 36, 37, on pages 84, 86

THERE are few things the housewife dreads more than the drudgery incident to the unpainted softwood floor. No other surface absorbs dirt so easily. The solution is the enameled floor, easily kept bright and sanitary, lightening the household task, and adding greatly to the appearance of the home.

The modern concrete or cement floor in commercial institutions has brought in another problem. A floor of this sort, because of hard usage, soon begins to "dust" and in time to powder or crumble away. Paint protection is an absolute necessity, for reasons of economy as well as of sanitation.

Patton's Florhide Enamel is made especially for the protection and beautifying of interior floors, whether cement, concrete, or wood.

Florhide Enamel is highly recommended for use in office buildings, public and private schools, factories, automobile garages and show rooms, hospitals, department stores, and institutions of all kinds, private and public.

Two coats of Florhide Enamel produce a tough, elastic, impervious, high-gloss finish that resists wear and abrasion to the highest possible degree. It is an Enamel and dries quickly, hard enough to be walked on overnight, but at least twenty-four hours should be allowed before applying the finishing coat.

Florhide Enamel covers approximately 250 to 300 square feet per gallon, two coats.

Sizes—Barrels; five-gallon, gallon, half-gallon, quart, and pint cans.

PATTON'S PORCHITE

FOR USE ON SURFACES SUBJECTED
TO HARD WEAR

For description, see page 29



DIXIE GRAY



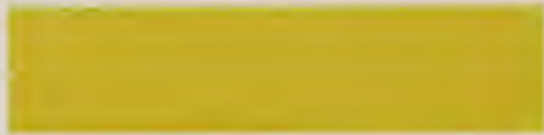
MALTESE BLUE



DARK SLATE



GRANITE GRAY



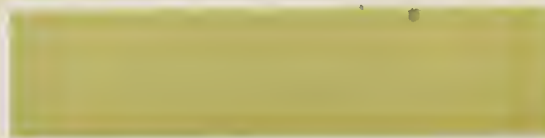
OLD GOLD



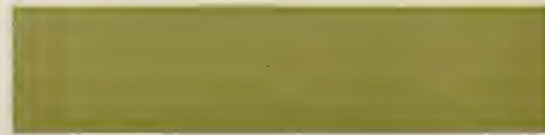
LEAF BROWN

PATTON'S FLORHIDE ENAMEL

FOR USE ON INTERIOR WOOD AND
CEMENT FLOORS



LIGHT DRAB



DIRT COLOR



LEAD COLOR



FAWN



LIGHT YELLOW



DARK YELLOW



BROWN



MAROON

PROOF PRODUCTS



Patton's Porchite protects surfaces subjected to the severe wear of scuffing feet and exposure to the elements.

PATTON'S OIL COLORS

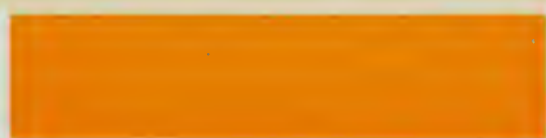
For description, see page 34



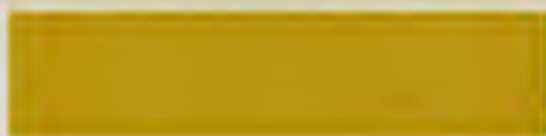
CHROME YELLOW—LIGHT



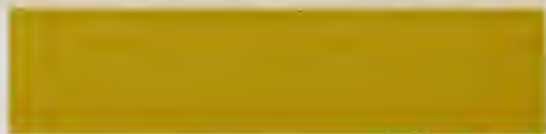
CHROME YELLOW—MEDIUM



CHROME YELLOW—ORANGE



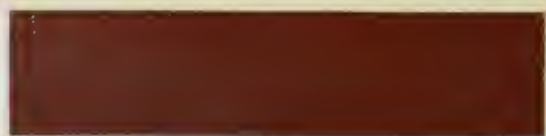
FRENCH CROWN GOLDEN OCHRE



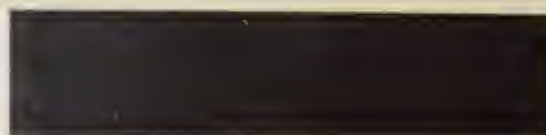
FRENCH WASHED OCHRE



RAW ITALIAN SIENNA



BURNT ITALIAN SIENNA



ENGLISH ROSE PINK



ENGLISH VERMILION—LIGHT



ENGLISH VERMILION—DEEP



AMERICAN VERMILION



SUN-PROOF VERMILION



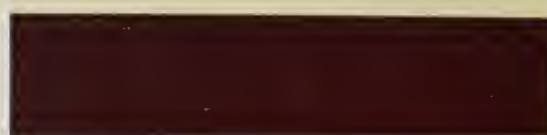
ORIENTAL PERMANENT RED—LIGHT



ORIENTAL PERMANENT RED—MEDIUM



VENETIAN RED

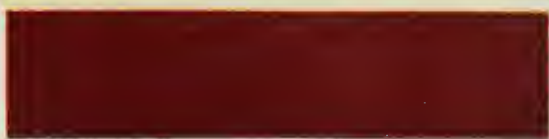


TUSCAN RED

PROOF PRODUCTS

PATTON'S OIL COLORS

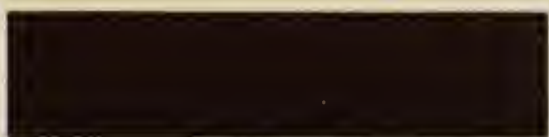
For description, see page 34



TURKEY RED



INDIAN RED



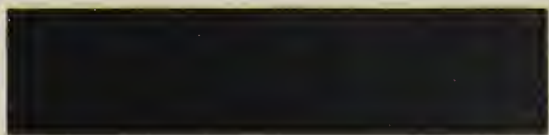
ENGLISH ROSE LAKE



ULTRAMARINE BLUE



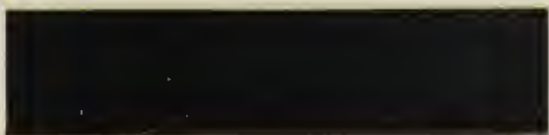
PRUSSIAN BLUE



DROP BLACK



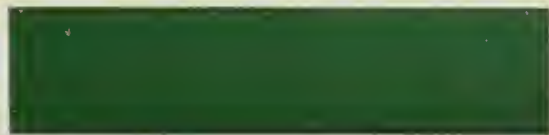
RAW TURKEY UMBER



BURNT TURKEY UMBER



CHROME GREEN—LIGHT



CHROME GREEN—MEDIUM



CHROME GREEN—DARK



VANDYKE BROWN



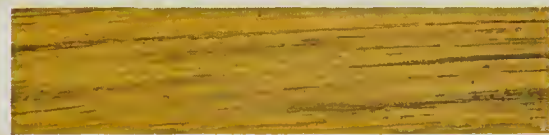
COBALT BLUE



SIGN WRITERS' ELACK



LIGHT OAK GRAINING COLOR



DARK OAK GRAINING COLOR



PATTON'S OIL COLORS

For color chips, see pages 32, 33

PATTON'S Oil Colors are intended principally for tinting and coloring. It is essential that such colors be uniform in purity, fineness, strength, and color. A low price per pound does not mean economy. The best colors are the cheapest because less material is required for tinting, and also because they are dependable in every respect.

The pigments are divided into two principal classifications: natural—Umbers, Siennas, Vandyke Browns, Yellow Ochre, and natural oxides; and manufactured—Blacks, Blues, Greens, Vermilions, Chrome Yellows, and Tuscan, Venetian, and Indian Reds.

The manufactured colors used in the making of Patton's Oil Colors are made in our own Dry Color Plant. By carefully grading and selecting the most suitable colors, we insure uniformity in the finished product.

Just enough Linseed Oil is used to produce a soft paste, which may be reduced with Oil, Leptyne or Turpentine, and Drier to the consistency of liquid paint and may also be used in the making of Stains.

Sizes—Buckets containing between twenty-five and sixty pounds and pots containing from twenty-five to thirty pounds, depending on the weight of the different oil colors packed in this style of package; also twenty-five, twelve and a half, five, and one-pound cans. (The Blues also in one-half and one-quarter pound cans.)



PATTON'S VELUMINA

For color chips, see page.....35

For examples of work, see pages 104 to 120

For specifications for use, see Nos.

32, 33, 34, 35, on pages.....85, 86

THE WALL is of supreme importance in interior decoration. It serves as the background or "frame" for the furnishings, tying them together into one harmonious whole. All the difference between pleasant and unpleasant rooms often depends merely upon the right or wrong wall treatment.

A wall should be inconspicuous, soft, and mellow in appearance, and these requirements call for the use of a Flat Wall Paint.

Patton's Velumina is an Oil Flat Wall Paint, made especially for interior decorative purposes. The liquid in Velumina is treated in a manner to cause it to dry flat, with that velvet softness essential to artistic decoration.

Velumina dries with a smooth, tough, elastic, "Pore-Proof" film, which will not readily collect dust or dirt. The dirt stays on the surface, where it is easily washed away, and the walls are thus kept clean and sanitary.

It is almost impossible to figure accurately the covering capacity of Flat Wall Paints, because the degree of absorption of different walls varies; but approximately, Velumina, when reduced according to directions, for new work covers from 450 to 800 square feet per gallon, first coat; without reduction for the finishing coat, Velumina covers about 400 to 500 square feet.

Sizes—Barrels; five-gallon, gallon, half-gallon, and quart cans. (White only also in pint and half-pint cans.)

PROOF PRODUCTS

PATTON'S VELUMINA

THE OIL FLAT WALL PAINT

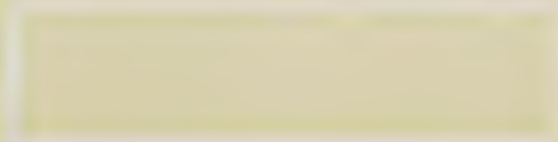
For description, see page 34



PEARL GRAY



FRENCH GRAY



IVORY



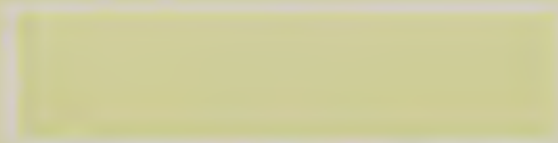
LIGHT BUFF



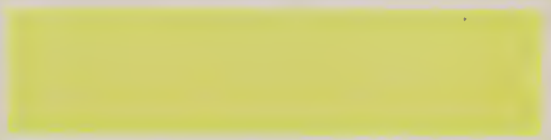
SILVER GREEN



NILE GREEN



LIGHT CREAM



RICH CREAM



PALE BLUE



AZURE



PINK



PALE RASPBERRY



MEDIUM BUFF



EVER-GREEN



CIRCASSIAN BROWN



OLIVE GREEN

ALSO WHITE



Patton's Industrial Building Paint will protect barns and fences.



PATTON'S INDUSTRIAL BUILDING PAINT

For color chips, see page.....38
For examples of work, see page.....36
For specifications for use, see Nos. 1,*
2, 3, 18, 19, 20, 21, on pages...32, 84

A GOOD Paint is a good investment anywhere: in the home, on the farm or on commercial buildings.

The banker more readily lends money on buildings which are kept well painted. It is his assurance that his security will remain constant and not shrink below the loan value.

Patton's Industrial Building Paint is made especially for painting barns, warehouses, grain elevators, and metal or wooden roofs; in fact, it is intended for use generally where a good serviceable paint, at moderate cost, is required.

Industrial Building Paint is not hand-mixed, but is thoroughly ground by powerful paint mills, making it a smooth, durable Paint, with good covering capacity.

Because a Paint of this description is generally used on rough lumber and on surfaces that are very dry and weather-worn, it is difficult to estimate accurately the covering capacity. Under average conditions, Industrial Building Paint will cover approximately 200 to 250 square feet of surface, two coats.

Sizes—Barrels; five-gallon, gallon, and quart cans.

*Substitute Industrial Building Paint for Sun-Proof when necessary to use a lower-priced paint.



PATTON'S WAGON AND TRACTOR ENAMEL PAINT

For color chips, see page.....38
For examples of work, see page.....36

THE protection of farm implements is neglected to a degree that is shocking. Usually they are left out in the open, and the attack of the elements is relentless and deterioration rapid. How often a dollar's worth of paint would save the usefulness of a hundred-dollar implement!

Patton's Wagon and Tractor Enamel Paint is made like an automobile enamel and is intended for interior and exterior work. It has an excellent gloss, and gives perfect satisfaction on wagons, sleighs, and farm implements and for general use on articles of utility in and about the farm home.

Wagon and Tractor Enamel Paint is not, strictly speaking, a paint, because it is made with a good grade of Exterior Varnish, which brings it into the class of Enamels. The pigments are selected for fineness of particles and permanence of color. Wagon and Tractor Enamel Paint works easily, flows splendidly, and dries with a high-gloss finish which sheds moisture and prevents decay of wood and corrosion of metal parts.

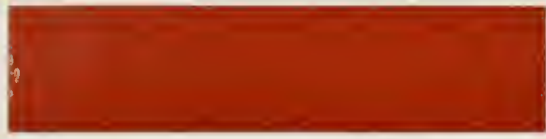
Sizes—Gallon, quart, pint, and half-pint cans.

PITTSBURGH PLATE GLASS COMPANY

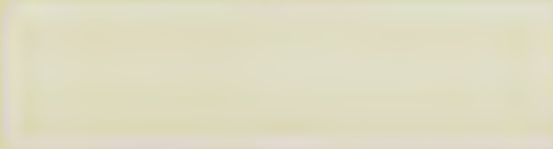
PATTON'S INDUSTRIAL
BUILDING PAINT

PATTON'S WAGON AND
TRACTOR ENAMEL PAINT

For description, see page 37



RED



WHITE



GRAY



YELLOW



GREEN



BROWN



YELLOW



VERMILION RED



GREEN



GRAY



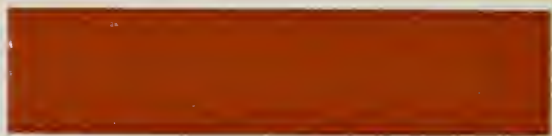
MAROON



KHAKI



BLUE

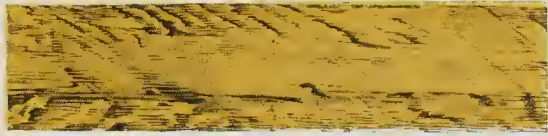


WAGON RED

ALSO BLACK

PATTON'S TOR-ON SHINGLE STAIN

For description, see page 40



RUSSET

362



MAROON

360



IVY GREEN

342



ROOF GREEN

353



INDIAN RED

343



WALNUT

363



MOSS GREEN

354



SLATE

366



Tor-on Shingle Stain will make this type of building last many years longer by warding off sun and rain, thus preventing warping and splitting of the shingles.



PATTON'S TOR-ON SHINGLE STAIN

For color chips, see page 39
For examples of work, see pages 99, 101,
102, 103
For specifications for use, see Nos. 6, 7,
on page 83

NO WONDER roofs decay! They are subjected to the direct rays of the sun, the rain beats down upon them, and nothing shields them from frost and snow. Roofs, beyond all else, need a protective coating.

The protecting and preserving qualities of Tor-on Ready-Mixed Shingle Stain result from its penetration into the wood. The pigments are high-grade colors ground in oil, and while they are as permanent as it is possible to make them, it should be remembered that the roof has 100 per cent exposure to the weather. As only a small quantity of color is used, the Stain cannot be expected absolutely to hold its color. This is especially true of the Greens. For best results, shingles should be dipped before being laid, and followed with a brush coat when the roof is completed.

Dipping—Two and one-half gallons of Tor-on Shingle Stain will dip 1,000 shingles two-thirds of their length.

Dipping and brushing—Three gallons of Tor-on Shingle Stain will dip 1,000 shingles two-thirds of their length, and brush one coat.

Brushing—One gallon of Tor-on Shingle Stain brushed on will cover from 60 to 70 square feet of surface, two coats.

Sizes—Barrels; five-gallon and gallon cans.

NOTE: Tor-on Shingle Oil also is furnished in metal drums, wooden barrels, and five-gallon cans to customers desiring to mix their own Stain.



PATTON'S AUTO GLOSS FINISH

For color chips, see page 42
For examples of work, see page 41

IN EVERY home there can be used to advantage a high-grade Enamel Paint for renewing and keeping new the surface of many articles. By neglect they will soon become unsightly, making replacement necessary.

At the first sign of wear on an automobile a protective coat of Varnish should be applied. Rust spots should be coated with the corresponding color at once. Porch furniture may be kept store-new; kitchen furniture, neat and sanitary; the store front, bright and attractive.

Patton's Auto Gloss is a high-grade, durable Color Varnish, suitable for exterior and interior work, especially adapted for automobiles, carriages, wagons, farm implements, porch, lawn and kitchen furniture, pumps, baby carriages, metal articles of all sorts, toys, store fronts, and the like.

Auto Gloss is easily applied, and has good working and flowing qualities; it dries in about eighteen hours with a perfect smooth finish and a high lustre.

The consistency of Auto Gloss is correct for all general purposes and its uniformity can be depended on always.

In the application of an enamel like Auto Gloss it is important that a good soft-haired brush be used. (See Brush Section of this volume, pages 125 to 152.)

Sizes—Gallon, quart, pint, half-pint, and quarter-pint cans.

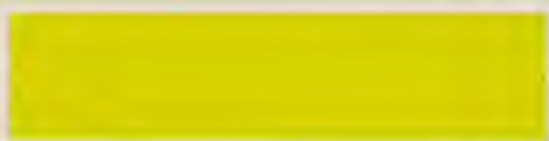
PROOF PRODUCTS



Patton's Auto Gloss is a general-utility enamel for use on all articles where a high-gloss color enamel surface is desirable.

PATTON'S AUTO GLOSS FINISH

For description, see page 40



CHASSIS YELLOW



LAWN GREEN



NAVY GRAY



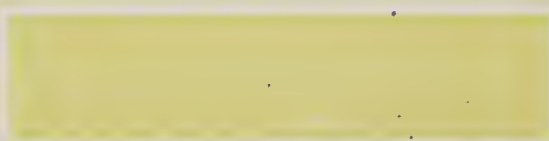
VICTORIA GREEN



WHITE ENAMEL



BREWSTER GREEN



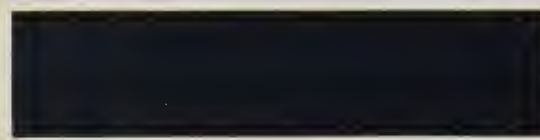
IVORY



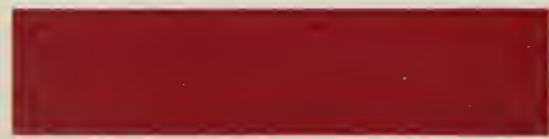
CANYON BLUE



CHASSIS RED



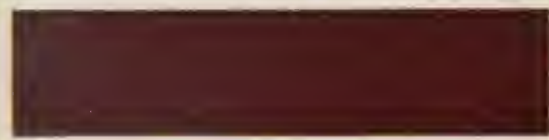
AUTO BLUE



NAVAJO RED



BLACK



MAROON



BROWN

ALSO CLEAR

PROOF PRODUCTS

PATTON'S CEMENTHIDE

FOR ALL CEMENT PURPOSES

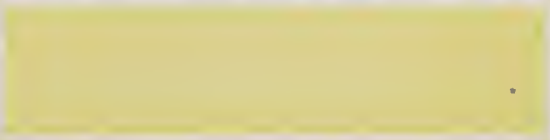
For description, see page 44



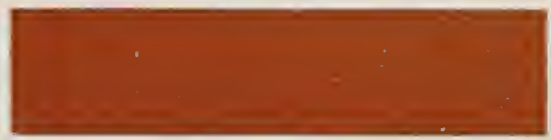
LIGHT CEMENT



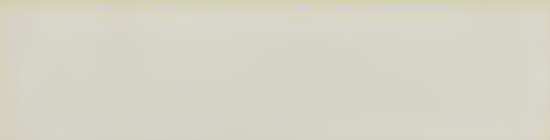
FRENCH GRAY



BUFF



RED STONE



WHITE



LIMESTONE



Patton's Cementhide will add greatly to the attractiveness of cement or stucco dwellings.



PATTON'S CEMENTHIDE

For color chips, see page 43
For examples of work, see pages 43, 100
For specifications for use, see Nos. 14, 15, on page . . . 83

THE large increase in cement and concrete construction has made necessary a special paint for such structures. The dull gray cement or stucco surface soon becomes unsightly and a material which will decorate such a surface successfully is much in demand.

Patton's Cementhide is a flat-drying Liquid Paint for painting cement, concrete, stucco, brick, stone, or plaster, both interior and exterior. It has the properties of a Filler and Waterproofing agent, and produces pleasing decorative results.

Cementhide is as easily applied as an ordinary paint and because of its permanency is much more economical for factory interiors, laboratories, engine rooms, basements, or garages than the so-called cold-water paints, calcimines, or whitewash. Cementhide dries hard and does not soften under water like ordinary paint. It is also affected to a much less degree by steam and alkaline vapors.

Cementhide Priming Liquid is a Sealer and a Primer, which must always be used with Cementhide in accordance with directions, and under certain conditions should be used with Sun-Proof Paint and Florhide Enamel. (See Specifications Nos. 16-19, 38, 39, on pages 84, 86.)

Owing to the great difference in the character of surfaces on which Cementhide is applied, it is difficult to give definite figures on covering capacity. Over a rough, absorbent surface, a spread of from 150 to 200 square feet, two coats, may be expected, and up to 300 square feet on a smooth, hard surface.

Sizes—Barrels; five-gallon, gallon, and quart cans.

PROOF PRODUCTS

PATTON'S IRONHIDE

PROTECTIVE PAINT FOR STEEL

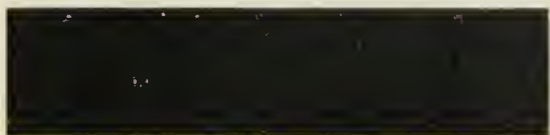
For description, see page 46



BROWN



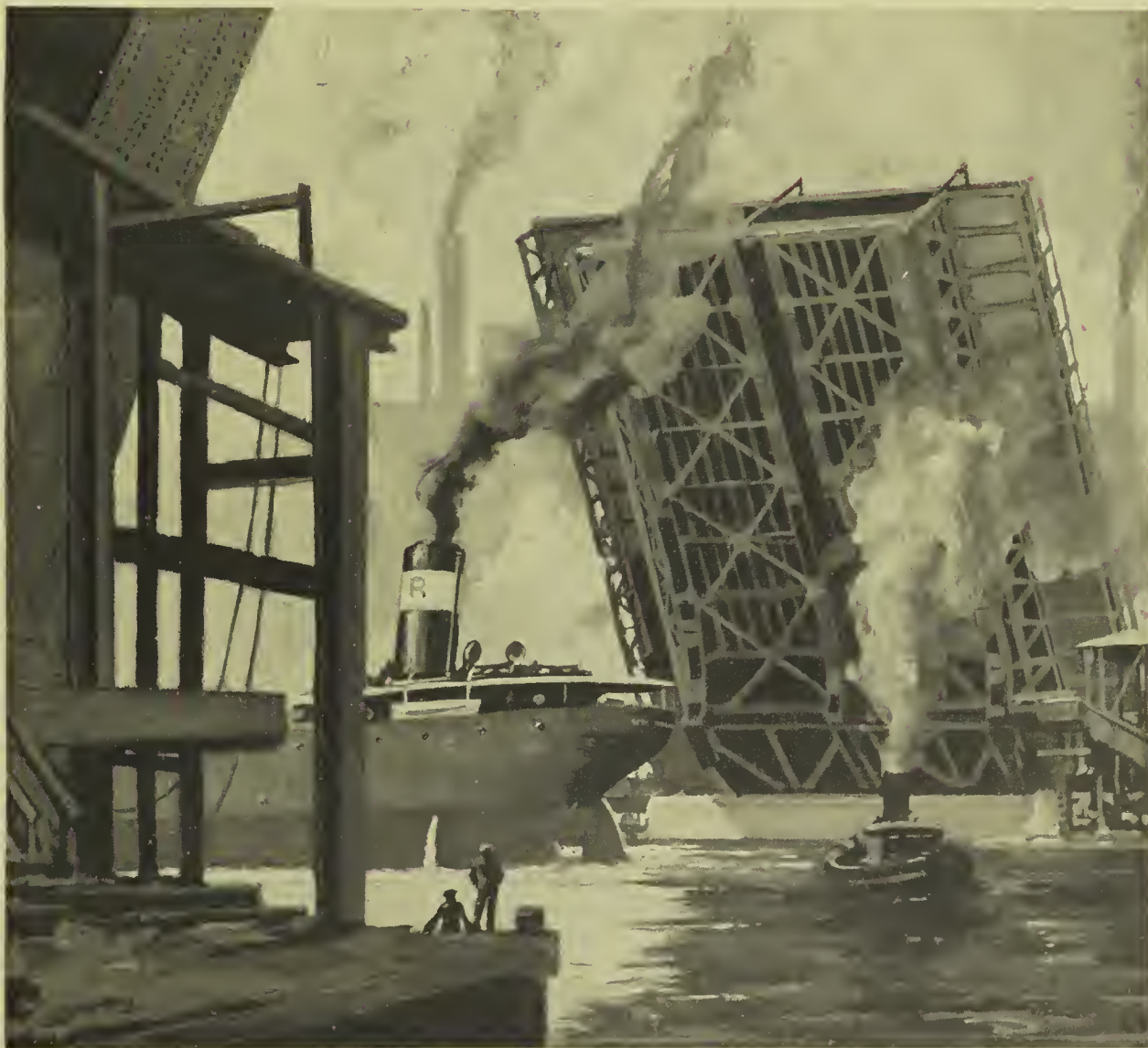
INHIBITIVE RED



GREEN



BLACK



Patton's Ironhide will protect all metal surfaces against rust, the great red plague.



PATTON'S IRONHIDE

<i>For color chips, see page.....</i>	<i>45</i>
<i>For example of work, see page.....</i>	<i>45, 121</i>
<i>For specifications for use, see Nos. 8, 9, 10, 11, 12, 13, on page.....</i>	<i>83</i>

THE preservation of metal surfaces is an economic necessity. No ordinary paint will perform this service satisfactorily. Patton's Ironhide is a liquid paint, ready for use, for the painting and preservation of iron and steel work, inside and outside, suitable for such use as on structural steel bridges, gas holders, smokestacks, railway cranes, oil tanks, iron or steel wire or light poles, coal loaders, steel cars, tank cars, air drafts, metal silos, fire hydrants, cranes, and ventilating fans.

Patton's Ironhide works easily, and while it dries in eighteen hours it is always advisable to allow at least three days between coats. It is of heavy painting consistency and requires a fair amount of brushing.

Ironhide is extremely elastic and tough, and produces a film very impervious to gases and moisture. Three-coat work will give service from five to eight years, depending upon the climate of the locality where the painting is to be done, the care taken in preparing the surface for receiving paint, and the method of application.

Inhibitive Red will cover 600 square feet per gallon, one coat; Finishing Black, 600 to 800 square feet per gallon, one coat; Brown, 600 square feet per gallon, one coat; and Green, 600 to 800 square feet per gallon, one coat.

Sizes—Barrels; five-gallon and gallon cans.



PLASCO READY-MIXED PAINT

For color chips, see pages 48, 49

For specifications for use, see Nos. 1,*

2, 3, 18, 19, 20, 21, 24, 25, 38, 39,

on pages 82, 84, 86

PLASCO Ready-Mixed Paint is intended for either exterior or interior work. It is made to meet the demand for a paint that can be sold at a price lower than must be asked for the highest quality, and is as good a paint as can be made for the price.

It works easily, covers well, has good body, dries with a good oil gloss, and will give exceptional service for the money invested.

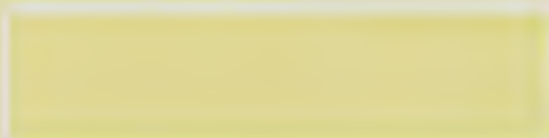
When used according to directions, one gallon will cover between 250 and 300 square feet per gallon, two coats.

Sizes—Barrels; five-gallon, gallon, quart, and half-pint cans.

*Substitute Plasco Ready-Mixed Paint for Sun-Proof when necessary to use a lower-priced paint.

PLASCO READY-MIXED PAINT

For description, see page 47



LIGHT CREAM

PL 1



GRAY STONE

PL 9



CREAM

PL 2



LIGHT STONE

PL 10



STRAW

PL 3



LIGHT GRAY

PL 11



MANILA

PL 4



MEDIUM GRAY

PL 12



BUFF

PL 5



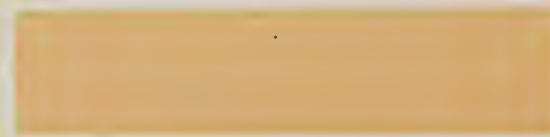
LEAD COLOR

PL 13



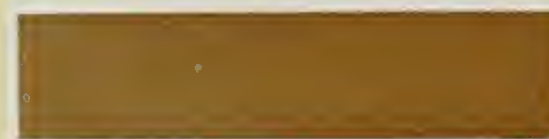
TAN

PL 6



PINK

PL 14



LEATHER BROWN

PL 7



TERRA COTTA

PL 15



RICH BROWN

PL 8



BRICK RED

PL 16

ALSO OUTSIDE WHITE, INSIDE FLAT WHITE, AND BLACK

PROOF PRODUCTS

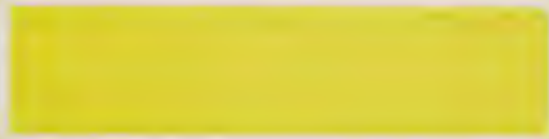
PLASCO READY-MIXED PAINT

For description, see page 47



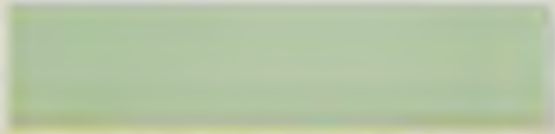
NILE GREEN

PL 17



LEMON

PL 21



LIGHT BLUE

PL 18



BLIND GREEN

PL 22



DEEP BLUE

PL 19



VERMILION

PL 23



WILLOW GREEN

PL 20



BRONZE GREEN

PL 24

ALSO OUTSIDE WHITE, INSIDE FLAT WHITE, AND BLACK



Paint will protect investments in homes and furnishings.



PITCAIRN WATERSPAR TRANSPARENT

For example of work, see page 51

A VARNISH made according to a special formula, possessing characteristics distinct and individual. This Varnish will never turn white in water, whether hot or cold, fresh or salt. Waterspar Transparent possesses sufficient elasticity to withstand severe weather exposure. It is a Long Oil Varnish, which dries dust-free in two hours and hardens ready for use in from eighteen to twenty-four hours.

The toughness and elasticity of Waterspar Transparent make it a desirable Varnish to use for exterior purposes—for window casings, doors, boats, and canoes. The fast- and hard-drying qualities make it an excellent Varnish to use on inside finishing, furniture, and floors. On account of its toughness, Waterspar Transparent will successfully withstand washing and scrubbing, whether hot or cold water is used. It has brilliant lustre, good body, and, possessing hard-drying qualities, may be rubbed with pumice stone and water to a dull finish without coming back to the gloss.

Because of its toughness and hardness and because it will never turn white in water, Waterspar Transparent is not affected by household accidents, such as the spilling of toilet preparations, hot food, hot or cold water, rain or snow coming in from an open door or window, leaking radiators, escaping steam, or sweating walls.

Sizes—Gallon, half-gallon, quart, pint, and half-pint cans.

PROOF PRODUCTS



Pitcairn Waterspar Transparent is a Varnish for universal use, and is indispensable for the protection of surfaces subjected to moisture.



PITCAIRN WATERSPAR COLORED VARNISH AND ENAMEL

For color chips, see page.....54

For examples of work, see page.....53

THE Waterspar line consists of a transparent waterproof Varnish for use on surfaces where the finish is dull and needs brightening, an Undercoater and Colored Varnish when complete renewal is necessary, and White and Colored Enamels for use when a solid color is desired.

This Varnish is made so as to enable anyone to secure good results by the exercise of ordinary care and judgment. It is unexcelled in free, easy, smooth-working qualities, and flows out perfectly, leaving a brilliant and lasting finish. Pitcairn Waterspar Colored Varnish and Enamel may be used in numerous places in and about the home. Because of its great elasticity and toughness it is especially adapted to the finishing and refinishing of floors, fine furniture, and interiors. Floors may be finished one day and used the next. A Waterspar finish is waterproof, and because of its great smoothness is easily kept clean. Wiping with an ordinary damp cloth is all that is necessary.

Surfaces finished with Waterspar Colored Varnish may be rubbed to a dull finish or polished. Old surfaces can be renewed without removing the old finish. The use of this Varnish brings out the life and beauty of the wood. It covers mars and scratches and keeps furniture, floors, and woodwork from appearing old or worn. Surfaces that are badly stained, dark, and unsightly, may be grained to imitate popular and expensive woods after receiving a coat of Waterspar Ground Color. Using Everybody's Graining Set (page 175, Sundries Section) in connection with Waterspar, the staining, graining, and varnishing are all done in a single, simplified operation.

Sizes—Gallon, half-gallon, quart, pint, half-pint, and quarter-pint cans.

PROOF PRODUCTS

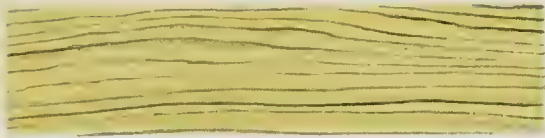


Pitcairn Waterspar Colored Varnish and Enamel will renew and beautify anything in and about the home.

PITCAIRN WATERSPAR COLORED VARNISH AND ENAMEL

FOR NEW OR OLD WORK

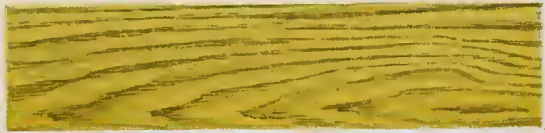
For description, see page 52



TRANSPARENT



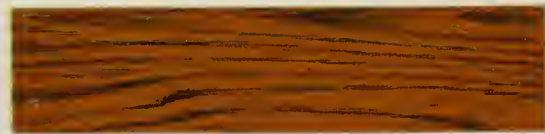
GROUND COAT



LIGHT OAK



IVORY ENAMEL



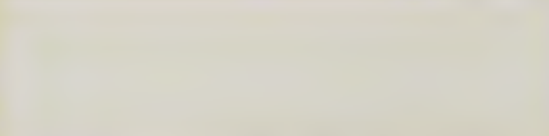
DARK OAK



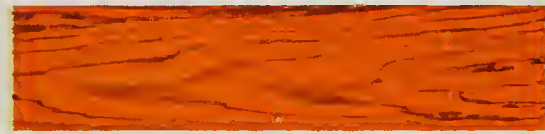
PEARL GRAY ENAMEL



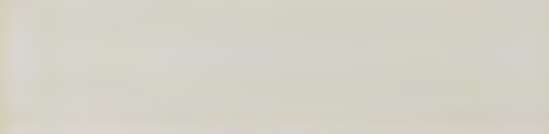
EXTRA DARK OAK OR WALNUT



FLAT WHITE



CHERRY



WHITE ENAMEL



MAHOGANY



PALE BLUE ENAMEL



DARK MAHOGANY



FERN GREEN ENAMEL



VERNAL GREEN



RICH CHERRY ENAMEL

ALSO ALUMINUM, GOLD, DULL BLACK ENAMEL, AND GLOSS BLACK ENAMEL

PROOF PRODUCTS

PITCAIRN WOOD STAIN

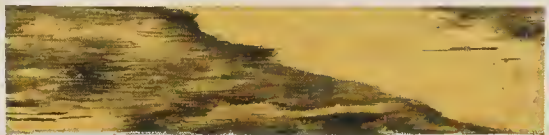
For description, see page 56



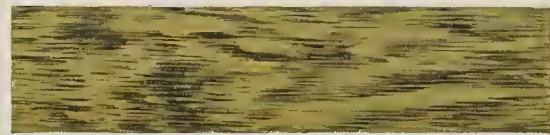
GREENISH WEATHERED STAIN NO. 4 PINE



EARLY ENGLISH STAIN NO. 12 PINE



GOLDEN OAK STAIN NO. 6 PINE



CIRCASSIAN WALNUT STAIN NO. 13 BIRCH



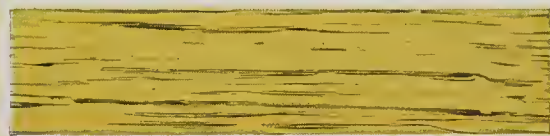
FLEMISH STAIN NO. 1 OAK



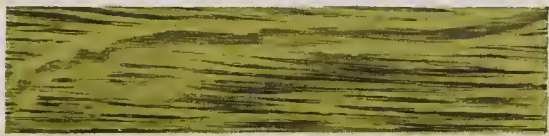
DARK MAHOGANY STAIN NO. 10 PINE



WEATHERED STAIN NO. 2 OAK



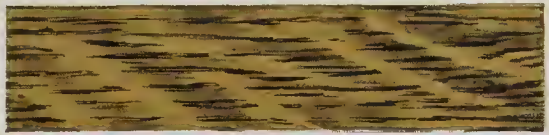
FUMED OAK STAIN NO. 11 OAK



GREENISH WEATHERED STAIN NO. 4 OAK



EARLY ENGLISH STAIN NO. 12 OAK



GOLDEN OAK STAIN NO. 6 OAK



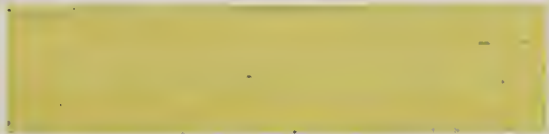
CIRCASSIAN WALNUT STAIN NO. 13 GUM



SILVER GRAY ACID STAIN OAK



DARK MAHOGANY STAIN NO. 10 GUM



FUMED OAK STAIN NO. 11 PINE



EXTRA DARK MAHOGANY STAIN NO. 15 BIRCH



PITCAIRN WOOD STAIN

For color chips, see page 55
For examples of work, see pages.....104 to 120
For specifications for use, see Nos. 50 to 79,
on pages 88 to 94

THE cost of the Stain used on the average building is exceedingly small when compared with the cost of labor of application, together with the cost of the Finishing Varnish and its application, yet the Stain has a most important bearing upon the finished job. It is the Stain that brings out the high lights and beauty of the wood and in view of the fact that one gallon of Pitcairn Wood Stain covers on the average from 800 to 1,000 square feet of surface, it is apparent that a difference of 50 cents a gallon in Stain will not amount to much on the average job. It is, therefore, not the bulk cost or cost per gallon that should be the deciding factor, but the results obtained and extent of surface covered. Pitcairn Wood Stains may cost more than others, but they are worth more.

There are many advantages to the painter in using Pitcairn Stains, which have extraordinary penetrating qualities, go into the wood to color it, and do not produce a surface finish only, as do the pigment stains. A pigment stain is, in reality, a thin paint, which obscures and clouds the grain of the wood.

Pitcairn Stains do not raise the grain of wood or affect thin veneers. This is proof that

they do not contain alcohol, water, acid, or alkali, as it is characteristic of such stains to raise the grain of wood and the moisture in water stains frequently blisters thin veneers.

Pitcairn Wood Stains may be reduced with turpentine or benzine the same as any product with an oil base. These Stains set slowly, which permits them to be used on large surfaces, greatly reducing the danger of laps or cloudiness over soft spots in the wood. Spirit stains, which usually have shellac as a binder, set very rapidly, and are difficult to handle on account of the tendency to lap and show clouded effects on soft spots.

The painter using Pitcairn Wood Stains has a still further advantage in that he may use them for tinting his Filler, with which they mix perfectly; in fact, Pitcairn Stains may even be mixed in Varnish for producing lake or glaze effects. Pitcairn Stains are neutral, and have no detrimental effect on the wood to which they are applied, or on the finishing coats that may be laid over them. The colors may be intermixed, thus producing a great variety of colors, tints, and shades.

Sizes—Gallon, half-gallon, quart, pint, and half-pint cans.

PROOF PRODUCTS



“**P**ROOF” is the general trade name applied to Paints, Varnishes, Enamels, and other allied products of the Pittsburgh Plate Glass Company. This trade name is a distinction of quality, and applies generally to these products, in addition to the official trade-marks of the individual lines.

Glass, Paints, Enamels, and Varnishes are indispensable alike to cottage, factory, and skyscraper; they protect and beautify our possessions.

These and innumerable other products—insecticides, disinfectants, and chemicals—comprising the entire line of Proof Products, are available always in dependable supply everywhere, at the command of architects, dealers, contractors, painters, building owners, food growers, and manufacturers.

From raw material to finished product, the manufacture and distribution of Proof Products are under one ownership, one organization, operating through specialized manufacturing divisions, effecting incalculable economies—both in manufacture and distribution—assuring dependability of supply and consistent maintenance of Highest Quality Standards.

PITTSBURGH PLATE GLASS COMPANY

GLASS

MANUFACTURERS

PAINT

PAINT AND VARNISH FACTORIES: MILWAUKEE, WIS.; NEWARK, N. J.; PORTLAND, ORE.



A Well-Displayed Stock of Paints



PAINT PROPOSITION FOR DEALERS

THE demand for Paints is universal. Paints, Varnishes, Enamels, Stains, Brushes, and other items included under the general term Paints are bought and used by, or for, every individual. Paint is used at some time during each year in every home, factory, office, hospital, school, warehouse, and store. Paint is needed to complete the work of the artisans in nearly all other crafts. It protects the surfaces of automobiles, tractors, farm implements, and wagons. It is ever-present on the highways and byways, decorating and preserving houses, barns, bridges, and fences, and in our streets it protects and makes more sightly the poles that carry the electric wires.

At one time the Paint business was thought of by many as active only during the Spring and Fall. There is no reason why this should be the case. The interior painting surface of the average residence, apartment, or business building is about four times greater than the exterior painting surface. This interior finishing, as well as much outside painting, proceeds throughout the year, and specialties are constantly sold in small cans, over the counter, for refinishing automobiles, furniture, floors, porches, refrigerators, screens, and other articles and fixtures.

There is no sure road to success in merchandising; results depend in large measure on the merchant himself. However, there is a well-defined and wonderful aid to any merchandising plan—the force of advertising. Our publicity plans are based on recognized principles and have proved successful again and again.

Our method of advertising is a happy combination of a broad policy of general publicity, to give the goods national prestige, and a localized plan that focuses our national advertising, as a veritable spotlight, upon the store of the individual merchant.

Our national advertising is backed up by dealers' aids which enable each and every merchant to localize his efforts and secure for his establishment the reputation of being known as the Store for Paint. These helps enable our dealers to plan effective campaigns for securing the business of their localities.

It will be noticed that all the Patton Proof Products Labels bear one design, "The Sunface with its Rays." This is a wonderful merchandising aid. It means the identification of the trade-mark in the mind of the buying public.

In the matter of store display also this universal label is an important factor. A display of Proof Products stands out and attracts the eye, leaving a pleasant impression of uniformity, neatness, and stability.

Any one brand of our Paints successfully used by a consumer becomes at once a testimonial and indorsement of every one of our brands—and only by establishing a steady repeat business for the entire line of Paints can a dealer secure the utmost profit from that department.

The exclusive sale for Proof Products gives the agent not only protection on the business that is developed, but the benefits of our prestige and reputation acquired through having conducted a successful business for more than sixty years.

PITTSBURGH PLATE GLASS COMPANY

One of the most important advantages our organization offers the dealer-customer is Service.

Our distributing facilities save the dealer both money and annoyance. He can get his goods in the shortest possible time, and quickly replenish temporary shortages of any color or material. He secures low freight rates with minimum danger of damage to the shipment in transit.

Freight and cartage paid on minimum shipments mean a sacrifice of profit. On the other hand, the purchase of more material than is

really needed, while possibly reducing the freight, will almost certainly result in an overstock. Only by carrying a full line, and purchasing all goods required from one convenient source, can the dealer secure these profit-making advantages.

On page 58 we show a photograph of a well-displayed stock of Paints.

Correspondence is invited from responsible dealers in all localities. We have a proposition of interest and profit to offer.

PROOF PRODUCTS

PATTON'S ALBA-LUX (WHITE LIGHT)

(Gloss, Flat, and Egg-Shell Gloss)

Patton's Alba-Lux (Gloss) is an Oil Paint for interior use; dries with a tough, elastic, enamel-like finish; will remain white; is easily kept clean; will withstand repeated washing; will not crack or flake off; is not affected by vibration, as of machinery.

Alba-Lux can be used for interior work on wood, metal, plaster, or cement, either when new or if previously painted. A list of possible consumers for Alba-Lux would be too large to enumerate, but it will be found without an equal for use in:

Textile mills, factories, packing houses, breweries, creameries, laundries, ice cream plants, markets, office buildings, department stores, elevator shafts, power plants, hospitals, and, in fact, any interior where a durable white, light-reflecting paint is desired.

Alba-Lux (Flat) is also an Oil Paint similar in every respect to the Gloss, except that it dries to a flat finish.

The liquids in Alba-Lux are specially treated Oils and are absolutely free from resin or resinous materials. The gloss in Alba-Lux is obtained without the use of varnish.

Alba-Lux works easily, flows freely, and dries with an elastic, tough, enamel finish. Under normal conditions the drying time is from twenty-four to thirty-six hours. It is always best, however, to allow as much time as is practicable to insure thorough drying.

Alba-Lux, as it comes in the package, is of the right consistency for proper working and covering.

Patton's Alba-Lux is very opaque and has wonderful hiding qualities. When applied according to directions on a suitable surface, Alba-Lux will cover approximately as follows:

Flat on new work, first coat, 300 to 500 square feet.
Flat on old work, first coat, 450 to 640 square feet.
Flat on new or old work, second coat, 400 to 600 square feet or one coat refinish.

Gloss on new work, first coat, 300 to 500 square feet. Gloss on old work, first coat, 600 to 800 square feet. Gloss on new or old work, second coat, 600 to 800 square feet or one coat refinish.

Alba-Lux (White Light) is used almost exclusively for its light-reflecting properties, consequently there is little demand for colors. If desired, however, both Gloss and Flat can be tinted with Oil Colors.

The demand for a paint like Alba-Lux is in the natural order of progress and is due to the modern desire for better light and better sanitation, both of which mean greater efficiency and therefore better profits in any large institution.

Alba-Lux saves electric light. It brings daylight inside. Well-lighted factories reduce the risk of accident to workmen and damage to machinery and merchandise.

Surfaces painted with Alba-Lux will not readily collect dirt or dust, can be washed repeatedly, and, consequently, kept bright, clean, and sanitary.

The use of Alba-Lux makes repainting less frequent. Sizes—Barrels; five-gallon and gallon cans.

PATTON'S ALBA-LUX, EGG-SHELL GLOSS

Especially adapted for surfaces where neither the high gloss nor the dull flat effect is desired. Dries to a true Egg-Shell Gloss finish.

Sizes—Barrels; five-gallon and gallon cans.

PATTON'S SUN-PROOF WHITE

(Paste)

Patton's Sun-Proof White is tri-pigment paint made in heavy paste form, and when reduced with Linseed Oil, Leptyne or Turpentine, and Drier makes a perfect liquid paint that is more durable and at the same time less expensive than paint made from White Lead only; can be tinted with Oil Colors to desired shade.

Strictly pure Linseed Oil is the only liquid used in the manufacture of Sun-Proof White.

The following figures represent the covering capacity of Sun-Proof White after being reduced according to directions for new or old work:

First, or priming coat, new work, 350 to 400 square feet, one coat. Second coat, new work, 600 to 700 square feet, one coat. Third coat, new work, 600 to 700 square feet, one coat.

PROOF PRODUCTS

First coat, old work, 500 to 600 square feet, one coat. Second coat, old work, 600 to 700 square feet, one coat.

Sizes—Hundred, fifty, twenty-five, and twelve and a half pound kegs.

PATTON'S SNOLITE

Patton's Snolite is a Semi-paste Paint, but so heavy that it requires thinning and manipulation by the Master Painter. Snolite is distinctly different from any product heretofore offered, possessing the following exceptional points:

When thinned for painting, Snolite has fully one-half greater opacity than paints now considered standard.

Is furnished in semi-paste consistency that permits of reduction at minimum expense, while at the same time meeting all conditions of surface and drying.

Can be used for tinting with any color and can be mixed with any other white pigment.

Produces a Paint which is incomparably superior for spray painting because it can be applied thin, covers perfectly, and is non-poisonous.

Dries to a smooth, high-gloss surface of superior whiteness which eventually chalks moderately, leaving an excellent surface for repainting.

After chalking for a considerable time, Snolite will continue still to obscure the surface as well as standard paints newly applied.

On chalking, tints become lighter, as do those made from White Lead, but on tests made over a wide range of territory and on a large amount of surface it has always been observed that a remarkable uniformity of color is maintained without predominance of blotched and variegated colors so often in evidence on a chalking surface.

Can be used in industrial sections around gas works or oil fields without discoloration from hydrogen sulphide fumes.

Produces a Paint which, when finally thinned for use, is highly economical when surface covered and opacity of film are considered, resulting therefore in a very considerable saving in cost and superior results.

Durability: The large percentage of Linsced Oil combined with chemically inactive pigments produces a theoretically perfect Paint. Not satisfied with theory, we tested out Snolite in various parts of the country for a period of years prior to placing it on the market during the Spring of 1921. The perfect paint-film retained by Snolite after exposure for four and five years under varying climatic conditions has abundantly supported our laboratory experiments.

In placing Snolite before the Master Painter, it has been considered that best results will be obtained by leaving the manipulation in general to him as required by diversified surfaces and conditions which he will encounter. Certain basic directions, however, must be followed if satisfactory results are to be obtained:

The pigments in Snolite are all chemically inactive and without drying action on oil. In consequence, Snolite must be handled differently from paint con-

taining a high percentage of White Lead, which acts as a natural drier and also tends somewhat to flatten the surface after drying. Do not fail to observe the following instructions:

Under the same conditions—always use more Drier with Snolite than with White Lead.

Always use Snolite thinner than White Lead. *This is most important.*

Under sub-normal drying conditions increase Drier and replace part of oil in Undercoater with Leptyne or Turpentine to improve drying and reduce gloss.

Under sub-normal drying conditions, not only increase Drier, but use up to one-eighth gallon Leptyne or Turpentine per gallon of finishing coat.

Slow drying in humid weather leads to many paint failures, where fault is generally unjustly laid to materials. Avoid painting under such conditions if possible and assume no responsibility for results.

Paint caught in frost while drying is practically certain to result in failure, regardless of what is used. After frosts begin, painting is undertaken at great risk. Do not paint when temperature is below fifty degrees.

Such woods as cypress and cedar, containing, as they do, substances which very seriously retard drying, require special treatment for priming coat.

Sizes—Five-gallon steel containers and Painters' Pots containing 289.75 cubic inches.

PATTON'S TITANIC LIQUID WHITE

Patton's Titanic White is a Paint in liquid form which embodies the unusual properties elsewhere obtainable only in the semi-paste form of Snolite.

It has the same extraordinary covering capacity, producing a paint-film good for long service and one which leaves the surface in excellent condition for repainting.

Sizes—Barrels; five-gallon, gallon, and quart cans.

PATTON'S SILK-WHITE VELUMINA

Different from the regular White Velumina in texture and in finish produced. Silk-White Velumina is ground to extreme fineness and dries with a slight sheen. Especially suitable for use as an undercoat in preparing surfaces for Enamel. It may be used with equal facility on plaster walls and wood trim.

Sizes—Barrels; five-gallon, gallon, half-gallon, quart, pint, and half-pint cans.

PATTON'S GREENONA

Greenona is a trade name for a Green in Oil in paste form, made in five shades. Adding eight gallons of Linsced Oil to 100 pounds of Greenona will yield about thirteen gallons of paint ready for use.

The covering capacity depends largely on the condition of the surface and thoroughness in brushing. Greenona, when properly reduced and applied, should cover approximately 325 to 400 square feet to the gallon, two coats.

Many Master Painters carry in stock some colors of this description because they keep well, and by adding oil and color the painter can make just enough paint of the desired shade to take care of his requirements.

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Greenona is used extensively for house painting, trimming, store fronts, iron fences, and metal or wood telephone or telegraph poles.

Sizes—Sixty-pound buckets; thirty-pound pots; twenty-five, and twelve and a half pound cans.

PATTON'S FRENCH WASHED YELLOW OCHRE IN OIL

PATTON'S FRENCH CROWN GOLDEN OCHRE IN OIL

Made from Imported French Ochre; ground in strictly pure Linseed Oil to the consistency of a heavy paste. Used for tinting, with white or colored paints.

To reduce to brushing consistency, add six gallons of Linseed Oil and one-half gallon of Compo Drier to 100 pounds of Ochre. This will yield twelve and a quarter gallons of paint.

Sizes—Fifty-pound buckets; twenty-five, twelve and a half, five, and one-pound cans.

PATTON'S VENETIAN RED IN OIL

Venetian Red is ground in pure Linseed Oil to the consistency of a heavy paste. In the process of grinding, all the particles are thoroughly broken up and saturated with Linseed Oil.

By adding Linseed Oil, Leptyne or Turpentine, and Drier, a very durable and high-grade paint is made. This paint is very practical for painting barns, warehouses, and roofs, and for general exterior work.

To make a paint of good brushing consistency, add six gallons of Linseed Oil and one-half gallon of Compo Drier to 100 pounds of Patton's Venetian Red in Oil. This will yield about twelve gallons of paint.

Sizes—Fifty-five-pound buckets; twenty-five, twelve and a half, five, and one-pound cans.

PATTON'S SEVENTEENTH CENTURY WAX

A prepared Wax of natural color for polishing floors, standing woodwork, linoleum, furniture, automobiles, and the like. Ready for use without the addition of any other materials; spreads easily, and dries sufficiently hard in one-half hour for second application or for polishing.

One pound is ordinarily enough for about 300 to 350 square feet of surface, one application.

Sizes—Five, two, and one-pound cans.

PATTON'S ORIENTAL VARNISH STAIN

A perfect combination of Stain and Varnish. Each Stain is ready for use as it comes from the can, and stains and varnishes in one application. Anything made of wood and any kind of wood can be given a handsome finish of the desired color at a trifling cost.

This Stain is adapted for use on household furniture, floors, and interior woodwork, where one coat must complete the staining and varnishing process. Dries hard overnight.

We have with this line of Stain a Ground Color which we recommend for use as a first coater where Oriental Varnish Stain is used over old work.

Oriental Varnish Stain is made in these colors:

Cherry, Light Oak, Antique Oak, Mahogany, Walnut, Rosewood, Ebony, Moss Green, Ground Color.

Sizes—Gallon, quart, pint, and half-pint cans.

PATTON'S GRAINING COLOR

A Paste Paint, made in Light Oak and Dark Oak, to be thinned with Leptyne or Turpentine, applied over suitable ground coats, and worked, before it is dry, with graining combs and pads. When dry, Varnish is applied. The liquid used is pure Boiled Linseed Oil; the pigments, Umbers and Siennas reduced to shade with white pigments—semi-transparent in oil, and, therefore, well suited for use in graining colors. Solid, opaque colors would produce glaring contrasts, resulting in poor imitations of natural grain.

Patton's Graining Colors work easily and dry in about eighteen hours. If quicker drying is required or desired, a small amount of Compo Drier may be used in conjunction with the Leptyne or Turpentine for reducing.

Sizes—Five-pound and one-pound cans.

PATTON'S PASTE WOOD FILLER

Patton's Paste Wood Filler is made in heavy paste form, in Natural, Dark Oak, Mahogany, Golden Oak, light, and Golden Oak, medium. When reduced and applied to open-grained woods like oak, ash, chestnut, mahogany, and walnut, the Filler enters the pores of the wood, filling them completely, making it possible to get a smooth, even finish with subsequent coats of Varnish or Wax.

When reduced with Benzine, about one pound of Filler to one-half pint of Benzine, Patton's Paste Filler works and spreads easily and sets in about twenty minutes, ready for rubbing off. In about fifteen hours the Filler is dry enough for waxing and varnishing. One pound thinned according to directions, should fill about 150 square feet of surface.

Sizes—Fifty-pound kegs; twenty-five, twelve and a half, five, and one-pound cans.

PITTSBURGH OIL COLORS

Especially prepared, finely ground colors in oil, for the Master Painters' and Decorators' trade.

Lamp Black	American Vermilion
Drop Black	French Ochre
Chrome Yellow	Rose Pink
(Light, Medium, Dark)	Vandyke Brown
Indian Red	Light Oak Graining
Tuscan Red	Dark Oak Graining
Prussian Blue	Rose Lake
Raw Umber	Venetian Red
Burnt Umber	Chrome Green
Raw Sienna	(Light, Medium, Dark)
Burnt Sienna	

Sizes—Buckets containing from twenty-five to sixty pounds; and pots, from twenty-five to thirty pounds, depending on the weight of the different colors; also twenty-five, twelve and a half, five, and one-pound cans. (Prussian Blue also in one-half and one-quarter pound cans.)

PROOF PRODUCTS

PATTON'S LIQUID WOOD FILLER

Patton's Liquid Wood Filler is a preparation used for sealing and surfacing close-grained woods such as hemlock, pine, redwood, sycamore, cherry, gumwood, cypress, maple, and poplar.

It is an excellent first-coater or surfacer on all close-grained woods. Its chief function is to hold up and prevent absorption of the finishing coats of Varnish. Drying with a semi-flat finish, it requires but little sanding, making a firm, hard foundation for the succeeding coats of Varnish.

This filler may be used to advantage as a sizing or coating on walls before they are frescoed, as it prevents absorption and thereby gives an improved appearance to the finished work. A liquid wood filler never should be used on open-grained woods.

Sizes—Five-gallon, gallon, and quart cans.

RED SEAL LIQUID WOOD FILLER

A moderate-priced Wood Filler to be used for sealing and surfacing close-grained woods. Can also be used as a wall size.

Sizes—Five-gallon, gallon, and quart cans.

PATTON'S IRON AND STEEL FILLER

Patton's Iron Filler has been perfected for use directly on iron surfaces that are porous and uneven so as to give them a smooth surface for finishing coats.

To give an engine or machine a fine finish it is necessary that a surfacer be used which will in every way strengthen and improve the appearance of the finishing coats.

Patton's Iron Filler is a surfacer of this type. It is made of finely ground hard pigment and a special iron filler Japan.

Patton's Iron Fillers are furnished in a paste form which is easily applied and can be brought to a proper sanding surface in the minimum of time without rolling up under knife, leather, or cardboard. Where small imperfections are to be filled, the Iron Filler should be reduced with Naphtha to brushing consistency.

For airgun application a reduction of three parts of Filler to one of Benzine yields correct consistency.

Sizes—Barrels; fifty-pound kegs; twenty-five, and twelve and a half pound cans.

PATTON'S FRENCH GREEN SEAL ZINC COMPOUND IN OIL

Patton's French Green Seal Zinc is a French Process Zinc Oxide and Barytes ground in bleached Linseed Oil. It is used by the Master Painter for various purposes, the results to be obtained determining the method of mixing. It is used in connection with White Lead by painters wanting a combination paint; for enamel undercoater by mixing with turpentine; for making mixed paints for interior use by mixing with Linseed Oil, Leptyne or Turpentine, and Japan.

Sizes—Twenty-five, and twelve and a half pound cans.

PATTON'S FRENCH RED SEAL ZINC COMPOUND IN OIL

This is a product at a moderate price, very similar to Green Seal Zinc in Oil.

Sizes—Twenty-five, twelve and a half, five, and one-pound cans.

PATTON'S FRENCH ZINC IN DAMAR

French Zinc in Damar is an imported, high-grade Zinc Oxide, ground in Damar Varnish.

When mixed with Damar Varnish it produces a high-gloss White Enamel for interior use only.

The usual proportions for making Enamel are about seven pounds of Zinc in Damar to five-eighths gallon of Damar Varnish.

Can also be tinted if desired. It is best to tint Zinc before adding the Varnish.

Sizes—Twenty-five, twelve and a half, five, and one-pound cans.

PATTON'S GRAPHITE

(Paste)

Patton's Graphite is ground in pure boiled Linseed Oil to heavy paste form; is to be reduced to brushing consistency with Linseed Oil, Leptyne or Turpentine, and Drier; and is used for the same purpose as Patton's Liquid Graphite. Furnished in natural color only.

Natural Graphite, the pigment used, is recognized and accepted for its protecting and preserving qualities on metal surfaces.

When reduced to proper brushing consistency Patton's Graphite will cover from 300 to 350 square feet of surface, two coats, on new work; for old surfaces in bad condition three coats are recommended.

Sizes—Barrels; 250 and 100-pound kegs; twenty-five, and twelve and a half pound cans.

RED SEAL GRAPHITE

(Paste)

This is a moderate-priced paste Graphite, to be thinned with Linseed Oil, Leptyne or Turpentine, and Drier.

Sizes—Barrels; 250 and 100-pound kegs; twenty-five, and twelve and a half pound cans.

PATTON'S LIQUID GRAPHITE

A high-grade Graphite Paint in liquid form for painting and preserving iron and steel. Particularly suitable for structural steel, metal roofs, bridges, smokestacks, and boilers.

The liquid is Linseed Oil and a little Drier.

The pigment is a natural Graphite, a pigment recognized for its protecting and preserving properties on metal. Where colors are furnished it is necessary to reduce the percentage of Graphite to the extent of the amount of coloring pigment used to obtain the desired shade.

Graphite Paint brushes easily, dries in eighteen to twenty-four hours, has good, heavy body, and is non-fading.

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When applied according to directions, one gallon will cover perfectly from 375 to 450 square feet of surface, two coats.

On new, unpainted surfaces three coats are recommended.

Sizes—Barrels; five-gallon and gallon cans.

RED SEAL LIQUID GRAPHITE

(Formerly Keystone)

Red Seal Liquid Graphite is a Graphite Paint in liquid form for painting and preserving iron and steel. It is sold at a moderate price and is intended for use where the question of low cost must be considered.

Sizes—Barrels; 100 and 200-pound kegs; twelve and one-half pound cans.

TUSCAR BARN PAINT

For rough work only. Will give satisfactory service on fences, sheds, etc. Made in Red only.

Sizes—Barrels; five-gallon and one-gallon cans.

PATTON'S BLACKBOARD SLATING

A liquid preparation to produce a smooth surface on wood, plaster, or composition board.

Surfaces finished with Patton's Blackboard Slating can be written on with chalk or crayon, and will not rub glossy by constant use of eraser.

A paint for this purpose must be thin, to produce a surface that will not crack or chip off. Blackboard Slating will dry in about one hour after being applied.

Sizes—One-gallon, quart, pint, and half-pint cans.

PATTON'S CRACK PACK

Crack Pack is a non-shrinking, non-absorbent composition for filling cracks and crevices in floors and imperfections in wood.

Crack Pack is about the consistency of putty and works about the same. Under ordinary conditions it will dry in from twenty-four to forty-eight hours; where cracks are very large and deep, more time may be required.

Sizes—Five-pound and one-pound cans.

PATTON'S SHUFLI SCREEN PAINT

Shufli Screen Paint is a quick-drying, high-gloss, durable Varnish Paint for painting the mesh or frames of screen doors and window screens. Shufli is made in two colors, Black and Green.

The liquids are made from quick-drying, durable, Exterior Varnishes.

For making the Green we use chemically pure Chrome Green, and for the Black, pure Carbon Black.

Shufli Screen Paint brushes easily and will dry sufficiently hard overnight to permit use of screens the following day.

Shufli Screen Paint is purposely made thin to avoid clogging the screen-wire mesh and to facilitate drying.

In most cases one coat of Shufli Screen Paint will

suffice. When framework is new or in very bad condition two coats may be necessary.

Ordinarily one pint of Screen Paint will be sufficient to paint the mesh of one dozen average-size window screens or about eight doors.

Sizes—One-gallon, quart, pint, and half-pint cans.

PATTON'S STOVEPIPE ENAMEL

Patton's Stovepipe Enamel is a quick-drying, high-gloss, durable, and heat-resisting jet black Varnish Paint for refinishing stovepipes, hot-air furnaces, coal scuttles, or other metal surfaces. Can also be used for exterior work where a gloss black finish is desired. It is not intended for use on superheated surfaces. No paint will wear satisfactorily on metal surfaces that become red hot or come in direct contact with flames.

Stovepipe Enamel is medium-heavy in consistency and has good covering qualities, one coat usually being enough. If an extra finish is desired, two coats should be applied.

Stovepipes should be carefully cleaned inside and out and painted before being stored.

Sizes—Pint, half-pint, and quarter-pint cans.

PATTON'S SUN-BRIGHT METAL POLISH

Patton's Sun-Bright Metal Polish is a liquid preparation for cleaning and polishing brass, nickel, and copper. It is quick-acting and effective, and produces a high lustre that does not tarnish.

Sun-Bright Metal Polish will not scratch.

Safe to use, as it is non-inflammable.

The pigments do not settle hard in the package and every drop of Sun-Bright Metal Polish can be used effectively.

Sizes—Gallon, quart, pint, and half-pint cans.

PATTON'S SUN-BRIGHT FURNITURE POLISH

Patton's Sun-Bright Furniture Polish is a liquid preparation for cleaning and polishing all varnished interior surfaces.

It contains no acid or other injurious ingredients. Cleans and polishes easily with little labor. Polished surface will not develop a bloom.

Sun-Bright Furniture Polish should be well shaken before using, applied with a rag, rubbed dry, and polished with a soft cloth.

Sizes—Gallon, ten-ounce, and six-ounce cans.

PATTON'S DISTEMPER COLORS

Patton's Distemper Colors are for use in fresco work and cold-water painting. They are made from pure high-grade Lampblack, Drop Black, Vandyke Brown, imported Italian Siennas, and imported Turkey Umbers, ground extremely fine in water.

The advantage of using pure colors is in their strength and covering quality and their full body when dry—a faded-out appearance does not result, as would be obtained were reduced colors used.

PROOF PRODUCTS



PITCAIRN AGED SPAR VARNISH

NO EXPENSE has been spared in building the strongest possible organization in our manufacturing department. The best talent obtainable has been secured. Our two factories are equipped with modern chemical apparatus, laboratories, and every convenience for the scientific manufacture of Varnishes of the highest quality. We know, by actual proof, the true worth of each individual product and its relative value compared to highest market standards, which justifies the claims we make for quality.

Pitcairn Aged Spar Line of Varnishes represents the Pitcairn Idea of the best Varnishes that can be made for architectural wood-finishing, as well as the most satisfactory moderate-priced Varnishes.

The great popularity Pitcairn Aged Spar Varnishes are enjoying at this time among the more exacting wood-finishers throughout the country is due principally to the universal satisfaction they are giving. Any unprejudiced judge of good materials who has used these Varnishes will acknowledge their excellence.

The raw materials—gums, oils, and thinners—are cooked and made into the finished Varnishes by expert workmen, under supervision of our chemical staff. Our trade-mark and label and the scaled package are the purchaser's guarantee that the quality will be

found as represented. They are his protection and insurance of most satisfactory results.

IMPORTANT

The varying conditions and temperatures under which Varnish is applied forbids the naming of a definite drying-time. Therefore, the drying-time named herein is approximate. Care should be taken to have one coat dry before another is applied.

A Varnish never should be rubbed until after it has thoroughly hardened.

Varnish works best in a temperature of from seventy-five to eighty degrees Fahrenheit. In cold weather, when it is not possible to warm the room in which varnishing is being done, it may be necessary to add a little Turpentine to the Varnish. Be careful not to add too much.

Use Leptyne or Turpentine for cleaning brushes.

Do not pour Varnish back into the can.

Keep can well corked.

Never apply Varnish to a waxed surface without previously removing the wax.

Varnish will not dry and harden properly without good light and perfect ventilation. Keep Paints and Varnishes away from fire.

PITTSBURGH PLATE GLASS COMPANY

ARCHITECTURAL VARNISHES

PITCAIRN MAST SPAR

A Marine and Exterior Varnish for Use Where Extreme Durability is Demanded

Best Exterior Varnish.

Where great durability is required, it proves its superiority under the most trying conditions. It is not affected by salt or fresh water and has great elasticity and wearing qualities. Will not scratch or mar white. Dries dust-free in ten to twelve hours and hard in forty-eight hours. May be used over natural woods, painted or grained surfaces.

Sizes—Five-gallon, gallon, half-gallon, quart, and pint cans.

PITCAIRN DECK SPAR

A popular, reliable and satisfactory Varnish for boat decks, outside doors, and similar exposed surfaces. A good finishing Varnish for natural wood, painted or grained surfaces that are exposed to the weather. Elastic and hard-drying. Sets dust-free in eight to ten hours and hardens in three to four days.

Sizes—Five-gallon, gallon, half-gallon, quart, and pint cans.

PITCAIRN FINISHING SPAR

The best Varnish made for all fine interior architectural finishing. Has exceptionally free, easy-working qualities, great body brilliancy and permanence. Sets dust-free in eight to ten hours, and hardens in two days; may be rubbed in three days.

Sizes—Five-gallon, gallon, half-gallon, quart, and pint cans.

PITCAIRN FLOOR SPAR

A most popular, satisfactory and best-selling Floor Varnish.

Works perfectly under the brush; has great elasticity and brilliancy; will not mar white. An excellent Varnish for general interior finishing.

One or two coats of Floor Spar over linoleum will bring out the colors and greatly increase its life.

Sets dust-free in eight hours and hardens in twenty-four hours.

Sizes—Five-gallon, gallon, half-gallon, quart, and pint cans.

PITCAIRN FLAT VARNISH

For Artistic Interior Work

Very transparent—brings out the color of the wood and produces a richer and softer effect than Gloss Finish. Smooth and free from gritty particles.

Dries with an even, flat finish that has the appearance of being rubbed. Has the body and durability of Gloss Varnish—protects perfectly the surface to which it is applied and may be used on either new or old work.

One coat is sufficient to produce a dull, rubbed effect on old work or over an undercoat of Gloss Varnish for new work.

Where an oil-rubbed effect is desired, add one-quarter gallon of Pitcairn Finishing Spar to each gallon of Pitcairn Flat Finish.

Two coats applied to a new wood over Filler will produce a silky, soft mission effect.

Works nicely under the brush, flows out well—dries dust-free in two hours and hard in twenty-four hours; may be coated with a Gloss Varnish, or as many coats may be applied as are necessary.

Sizes—Five-gallon, gallon, half-gallon, quart, and pint cans.

CABINET RUBBING AND POLISHING SPAR

Best Varnish for interior and architectural finishing. Has exceptionally free, easy-working qualities, body brilliancy, and permanence.

Sets dust-free in eight to ten hours and hardens in two days; may be rubbed in three days.

Sizes—Five-gallon, gallon, half-gallon, quart, and pint cans.

PITCAIRN MASTER PAINTERS' SPAR

For General Interior Work

A brilliant, satisfactory, free and easy-working Varnish, intended for all general interior finishing.

Dries dust-free in about eight hours, hardens in about thirty-six hours. Rubs nicely to a full finish.

Sizes—Five-gallon, gallon, half-gallon, quart, and pint cans.

PITCAIRN PAINTERS' COACH

A reliable and satisfactory medium-priced Varnish. For high-gloss interior work.

Dries dust-free in about seven hours and hardens in three days. Has good body and works nicely.

Sizes—Five-gallon, gallon, half-gallon, quart, and pint cans.

PITCAIRN CHURCH PEW AND SEAT FINISH

An exceedingly hard-drying Varnish, which will never soften or become tacky under the heat of the body. Very tough—dries dust-free in six hours and hard in twenty-four.

For use on church and school seats, chairs, desks, table tops, and the like. Dries with brilliant gloss, rubs well, and takes a fine polish.

Sizes—Five-gallon, gallon, half-gallon, quart, and pint cans.

PITCAIRN COMPO DRIER

A safe, reliable and economical Japan Drier—sold only in sealed cans.

To make paint dry and work properly and still retain its durability a good Japan Drier must be used; to have paint always uniform a Drier of uniform strength must be used.

Sizes—Five-gallon, gallon, half-gallon, quart, and pint cans.

PROOF PRODUCTS

PITCAIRN PURE BATAVIA DAMAR

In this finish the best grade of Batavia Gum is used.

The Varnish is of extremely pale color and especially adapted for use in making White Enamels or for finishing white or very light surfaces. It has good body, works nicely, and dries perfectly.

Sizes—Five-gallon, gallon, half-gallon, quart, and pint cans.

PITCAIRN TO-YO-LAC

This Varnish is especially prepared for finishing cabinet work, furniture, chairs, tables, desks, and seats, whether in polished, dull rubbed, or gloss finish. Equally satisfactory for manufacturer or repairman, being in fact one of the few really safe varnishes for repairmen's use.

To-Yo-Lac works very smoothly and freely, flows well, and has excellent wearing quality. A coat may be applied every day; last coat may be rubbed after thirty-six to forty-eight hours. Sets to the touch and dries dust-free in two hours. Furniture finished with To-Yo-Lac may be safely rubbed and shipped in hot-weather without danger of printing.

Sizes—Five-gallon, gallon, half-gallon, quart, and pint cans.

BRONZING LIQUIDS

See page 176, in the Sundries Section.

BULK VARNISHES

See Manhattan Varnishes, page 73.

PITCAIRN PUBLIC BUILDING VARNISHES

Made according to government specifications.

These Varnishes are composed only of selected Fossil Gums, pure refined Vegetable Oils, pure Spirits of Turpentine, and pure Driers. They are free from other products of any character whatsoever. Great care is exercised in their making and aging.

No. 1080—PITCAIRN INTERIOR PUBLIC BUILDING VARNISH

This Varnish has a brilliant lustre, good body and color, and excellent working, drying, and hardening qualities. Sets dust-free in four hours and may be recoated in twenty-four hours.

It hardens sufficiently to take a dull rub on the third day and may be polished on the fourth day.

An exceptionally satisfactory all-around finishing Varnish. For use on cabinet work, etc., interior finish, seats or pews, table tops, fixtures, floors.

Sizes—Barrels; five-gallon and gallon cans.

No. 1081—PITCAIRN EXTERIOR PUBLIC BUILDING VARNISH

This Varnish has excellent body and color, free working and flowing qualities. It dries with a brilliant lustre that will withstand severe exposure, wear and tear.

Does not scratch or mar white and is not affected by fresh or salt water.

Sets dust-free in six hours and hardens in two to three days.

Used wherever great durability is required, such as outside doors and windows, Water Craft and Marine Finishing, whether over natural wood, painted, or grained surfaces.

Sizes—Barrels; five-gallon and gallon cans.

No. 1391—PITCAIRN PUBLIC BUILDING OIL DRIER

This Drier is composed of pure Lead and Manganese, pure Turpentine, pure Fossil Gums, and refined Vegetable Oils. It is free from all other products of any character, whatsoever.

Strong, safe, and reliable.

It is a good mixer with all pigments, and may be added to all paints or oils for the purpose of hastening their drying.

Five per cent of Pitcairn Public Building Oil Drier (No. 1391) added to raw Linseed Oil will cause it to dry to the touch in seven hours.

NOTE: An original analysis of any or all of the above, over the signature of our chemist, will be furnished upon request.

Sizes—Barrels; five-gallon and gallon cans.

PITTSBURGH PLATE GLASS COMPANY

EMPIRE VARNISHES

Carefully made from selected raw materials. Empire Varnishes may be used for the various purposes for which they are intended with a feeling of entire security that the work will be satisfactory. Empire Varnishes are easy-working, brilliant, and durable.

WHITE ENAMEL

A popular-priced White Enamel, adapted for use on all interior decorative work, giving a brilliant, durable finish.

Produces a hard, non-absorbent, pure white surface that will retain its color and brilliance. Works well and flows out, leaving a smooth, white finish, free from brush marks or laps. Has good covering qualities. May be used on any surface—wood, metal, brick, or plaster, and for old or new work after the surface has been prepared with flat undercoats. Dries dust-free in twelve hours and hardens in twenty-four hours. A bluish hue, an ivory cast, or delicate tints may be produced by the addition of a small amount of Ultramarine Blue, Chrome Yellow Medium ground in oil, or other pure tinting colors.

Sizes—Five-gallon, gallon, half-gallon, quart, pint, and half-pint cans.

INTERIOR FINISH

A durable Varnish for general work on interior surfaces in either public or private buildings. Very pale in color, elastic, free-working, dries with a brilliant lustre, and may be rubbed to a dull finish or polished if desired. Sets dust-free in about ten hours and hardens in three to four days.

Sizes—Five-gallon, gallon, half-gallon, quart, pint, and half-pint cans.

FLOOR FINISH

A durable finish for hardwood floors, linoleum, table tops, and similar uses. Dries hard overnight, conditions being favorable. It is elastic, light in color, and will not scratch or mar white. Because of its toughness, Empire Floor Finish makes an excellent Varnish for general interior work.

Sizes—Five-gallon, gallon, half-gallon, quart, pint, and half-pint cans.

FLAT FINISH

One coat is sufficient to produce a dull, rubbed effect on old work, or over an undercoat of Gloss Varnish on new work. One coat applied to new wood over Filler or Stain will produce a beautiful, silky, soft mission effect.

Flat Finish is transparent, brings out the color of the wood, and produces a richer and softer effect than Gloss Varnish.

Sizes—Five-gallon, gallon, half-gallon, quart, pint, and half-pint cans.

OLD FASHIONED No. 1 COACH

A High Gloss Varnish for interior woodwork and for painted surfaces. Very satisfactory for all ordinary purposes. Has good body, works freely, and will dry hard in thirty-six hours. Recommended to those wanting a good article at a popular price.

Sizes—Five-gallon, gallon, half-gallon, quart, pint, and half-pint cans.

FURNITURE VARNISH

This Varnish is intended for household purposes and repair work where a quick-drying Gloss Finish is required. Has light color, good body, and sets hard in twenty-four hours. We recommend it to those wanting a bright finish at a reasonable price.

Sizes—Five-gallon, gallon, half-gallon, quart, pint, and half-pint cans.

ASPHALTUM

Our aim in the manufacture of this Black has been to produce an article which will dry with a high, glossy-black finish, and one that will be satisfactory as a one-coat Black Finish. Suitable for use on all kinds of metal surfaces, such as wire screens, stove-pipes, iron fences, hot and cold water pipes, agricultural implements, and castings of all kinds. It will prevent rust and deterioration and prolong the life of metals to which it is applied. By reason of its composition, this Black may be relied on to withstand a high degree of heat. May be reduced with Turpentine or Naphtha. Sets dust-free in two hours and hardens in twelve hours.

Sizes—Five-gallon, gallon, half-gallon, quart, pint, and half-pint cans.

LIQUID WOOD FILLER

A good grade of Liquid Wood Filler for general work. Extra light in color and may be used on light woods without darkening them. Contains a transparent mineral pigment intended to be used as a First-coater or Surfacer on close-grained woods. Seals the surface, making a non-porous foundation for Varnish coats. May be reduced with either Leptyne, Turpentine, or Benzine. Dries hard over night. Sandpapers nicely. Can safely be coated over the next day without danger of checking or shrinking. One coat of Empire Liquid Wood Filler and one coat of Varnish will produce a finish which will be found satisfactory for all cheap work.

Sizes—Five-gallon, gallon, half-gallon, quart, pint, and half-pint cans.

PROOF PRODUCTS

PITCAIRN AUTOMOBILE VARNISHES

These Varnishes are so made as to withstand, for the longest time possible, the exposure, hard knocks, and wear and tear to which automobiles are subjected.

In bringing them to their present state of perfection, special attention has been given to the requirements of the modern finisher of fine automobiles. Time is an important factor in modern automobile finishing. Pitcairn Aged Automobile and Carriage Varnishes permit of the finest work being turned out in a minimum of time. They are not sensitive to atmospheric changes while in the process of drying. Their use insures the maximum of durability to be obtained in automobile finishing.

The body Varnishes are made of the finest materials obtainable, have exceptionally free-flowing qualities, are pale in color, dry free from dust quickly, and yet set slowly enough to enable the finisher to make a perfect job on the largest surfaces.

The gear Varnishes are especially prepared to withstand the frequent washing and constant exposure, grease, dust, and dirt, to which automobile gear and chassis are subjected. They are full-bodied, pale in color, free-working, and will withstand severest usage. When used on exposed surfaces they are especially adapted to the requirements of Railway Car Finishing. They will withstand the severe wear and tear encountered in Railway and Car Service.

PITCAIRN EXTRA PALE AUTO WEARING BODY

For Use over Lightest Colors on Finest Work

This Varnish is intended to be used on the finest body-finishing, where extreme paleness of color, brilliancy, and great durability are required. Flows out perfectly, sets slowly, permitting best results on largest surfaces. Dries dust-free in eight hours and hardens in three to four days.

Sizes—Five-gallon, gallon, half-gallon, quart, and pint cans.

PITCAIRN FINEST AUTO WEARING BODY

Best Auto Finishing Varnish

This Varnish is intended for use on the finest Motor Car Finishing. Pale, durable, free-working, safe Varnish. Dries free from dust in eight hours, yet sets slowly, thus allowing ample time to make a perfect job on the largest surface. Hardens in three to four days.

Sizes—Five-gallon, gallon, half-gallon, quart, and pint cans.

PITCAIRN AUTO HARD-DRYING BODY

For Finishing Coats

Especially intended for durable, hurried work, where a heavy-bodied, free-working, good-drying Varnish is required. Is brilliant, safe, and durable.

Sizes—Five-gallon, gallon, half-gallon, quart, and pint cans.

PITCAIRN ONE-COAT AUTO

A One-Coat Finishing Varnish for Hurried Work

Heavy-bodied; dries sufficiently hard to handle in twenty-four hours. Possesses good gloss, works freely, and is very durable.

Sizes—Five-gallon, gallon, half-gallon, quart, and pint cans.

PITCAIRN PALE AUTO CHASSIS OR ELASTIC GEAR

For Use over Lightest Colors on Finest Work

Intended for use on chassis and underparts, where extreme paleness of color, brilliancy, and durability are required. Very free-working, dries dust-free in six hours, and hardens in two days.

Sizes—Five-gallon, gallon, half-gallon, quart, and pint cans.

PITCAIRN HEAVY GEAR

A Heavy Varnish for Work on Chassis and Wheels

For use in finishing wheels and underparts of automobiles and carriages, where a heavy Varnish is required. Has free-working qualities; brilliant and durable. Dries dust-free in six hours and hardens in two days.

Sizes—Five-gallon, gallon, half-gallon, quart, and pint cans.

PITCAIRN HARD-DRYING GEAR

For Finishing Coats

A full-bodied, brilliant, quick-drying Gear Varnish. Dries dust-free in six hours and hardens in twenty-four to thirty-six hours.

Sizes—Five-gallon, gallon, half-gallon, quart, and pint cans.

PITCAIRN PALE AUTO RUBBING BODY

A Four-Day Rubbing Varnish

For undercoats on finest work over lightest colors. Especially desirable for use under our Extra Pale Auto Wearing Body Varnish. Possesses good leveling qualities and dries to rub in four days.

Sizes—Five-gallon, gallon, half-gallon, quart, and pint cans.

PITTSBURGH PLATE GLASS COMPANY

PITCAIRN QUICK-RUBBING

A Two-Day Rubbing Varnish

Always safe and reliable. May be rubbed close without sweating in forty-eight hours.

Sizes—Five-gallon, gallon, half-gallon, quart, and pint cans.

PITCAIRN DOUBLE-QUICK RUBBING

Quick-drying, free-working. Can be rubbed in twenty-four to thirty-six hours.

Sizes—Five-gallon, gallon, half-gallon, quart, and pint cans.

PITCAIRN EXTRA BLACK BODY-RUBBING

For Undercoats on Automobile and Carriage Bodies

Produces a deep, black finish. When used over flat black, produces a hard, tough surface. Can be mossed in twenty-four to thirty-six hours and ready for re-coating with clear rubbing.

Sizes—Five-gallon, gallon, half-gallon, quart, and pint cans.

PITCAIRN BLACK BODY-RUBBING

For undercoats on carriage bodies, producing a deep finish when used over flat black color.

Sizes—Five-gallon, gallon, half-gallon, quart, and pint cans.

PITCAIRN WAGON COACH

For Finishing Auto Trucks and Wagons

Where great durability and free-working qualities are required. Dries dust-free in six hours and hardens in twenty-four hours.

Sizes—Five-gallon, gallon, half-gallon, quart, and pint cans.

PITCAIRN JAPAN GOLD SIZE

Also Used as a Binder for Drying and Hardening Colors—May be Mixed with Varnish

Pale Japan for leaf sizing. A good, safe Drier for Color, Rough Stuff, and hard putty.

Sizes—Five-gallon, gallon, half-gallon, quart, and pint cans.

PITCAIRN PALE COACH JAPAN

Very strong, light in color, quick drying. Used principally for binding Colors.

Sizes—Five-gallon, gallon, half-gallon, quart, and pint cans.

PITCAIRN ROUGH STUFF

Always Reliable and Satisfactory

A perfect filler for automobile, carriage, and coach finishing. Produces a smooth, solid, non-porous surface on which to build the final finish. Cuts down, without clogging the pumice stone.

Sizes—Five-gallon, gallon, quart, and pint cans.

PITCAIRN AIR DRYING BODY AND FENDER ENAMEL

An especially high-grade, free-flowing, solid-covering Jet Black Finishing Enamel, suited for brush work on auto bodies, fenders, hoods, gears, and all metal parts. Works like Finishing Varnish and dries with a full, brilliant lustre. Sets dust-free in six hours, and hardens in thirty-six hours.

Sizes—Five-gallon, gallon, half-gallon, quart, and pint cans.

PITCAIRN BLACK ELASTIC BAKING FINISHING ENAMEL

A high-grade, Jet Black Enamel. May be applied by either brushing or dipping. Produces an extremely tough, elastic, and enduring finish on automobile fenders, hoods, and metal parts. Bake it in 280 degrees of heat for three hours.

Sizes—Five-gallon, gallon, half-gallon, quart, and pint cans.

PITCAIRN BLACK UNDERFRAME ENAMEL

Covers Solid Black in One Coat

Not so heavy-bodied or free-flowing as Pitcairn Body and Fender Enamel. Use on smaller surfaces and running parts. A general-purpose, tough, jet black, brilliant Finishing Enamel. Dries overnight and hardens in twenty-four hours. Withstands a high degree of heat on radiators. May be baked lightly up to 175 degrees and is then ready for use after two hours. In addition to using for running parts on autos, also use on inside of wagon or truck boxes, battery boxes, iron fences, school seats, or stoves.

Sizes—Five-gallon, gallon, half-gallon, quart, and pint cans.

TRANSPARENT SEALER

Made from Pitcairn Waterspar Varnish

Dries dust-free in two hours and hardens overnight. Never lets go. Insures an elastic foundation for other finishing materials. Is waterproof and a superior Rust Preventive.

We recommend that Waterspar be reduced one-third with Turpentine and used on new work as a Transparent Sealer, Rust Preventive, and Priming Coat on all metal bodies and other metal surfaces that are to be painted or finished. Also for use as a Primer on wooden wheels. When used as a sealer it must not be sanded. After allowing twenty-four hours for drying, continue with succeeding coats.

PIGMENT PRIMER

To be Made in the Shop

A Pigment Primer can be made by mixing two or three pounds of Pitcairn Rough Stuff, or two or three pounds of Iron Oxide (Red) ground in oil, to the gallon of Waterspar. This Pigment Primer should be used over Transparent Sealer. Use as a sealer and surfacer (after sanding) on old work that is badly cracked, checked, and more or less porous and absorbent. For this work a small amount of color to match the body coat should be added. Apply one

PROOF PRODUCTS

thin coat, allowing twenty-four hours for drying. Then proceed with the color coats.

Use Transparent Sealer, made from Waterspar, over Rough Stuff after it has been rubbed or blocked. This stops suction and makes an excellent undercoater for succeeding color coats.

This transparent sealer made from Waterspar is an excellent crank-case sealer and a preservative coating for underframes and all kinds of metal auto parts while in stock, before being assembled into cars.

PITCAIRN MOHAIR TOP DRESSING

For Waterproofing and Preserving Old and Worn Auto Tops

This is an Oil-base Dressing and while drying a little more slowly than Spirit Dressings the results are

much superior. This material preserves and renews old tops and can be used with perfect safety, as there is nothing in it to injure the fabric. It is easily applied and dries ready for use the next day. When used on pantasote auto tops, it dries out with a semi-gloss oil finish.

Sizes—Five-gallon, gallon, half-gallon, quart, and pint cans.

PITCAIRN CARRIAGE TOP DRESSING

For carriage tops and aprons. Dries hard in forty-eight hours, yet remains elastic. This material contains more pigment than the Mohair Top Dressing and dries out with a brilliant jet gloss.

Sizes—Five-gallon, gallon, half-gallon, quart, and pint cans.

PITCAIRN JAPAN COLORS

Pitcairn Japan Colors are of the highest standard of quality. The clear, brilliant tones obtained are due to the purity of the raw materials used in their manufacture. These materials, with a few minor exceptions, are manufactured within our organization. Absolute constancy of shade and strength is assured by rigid laboratory tests.

Japan Colors have to be ground according to a special method. We do this work under expert supervision. Pitcairn Japan Colors will meet the most exacting demands of the critical finisher. For clearness and brilliancy of shade, richness and depth of tone, they have no equal.

Sizes—Five-pound and one-pound cans.

LIST OF COLORS

BLACKS

Ivory Drop Black
E-Ivory Drop Black
Superfine Ivory Drop Black
Lamp Black

GRAYS

French Gray
Auto Body Gray, Light
Auto Body Gray, Medium
Auto Body Gray, Dark

WHITES

Silver White
Flake White

BLUES

Azure Blue
Electric Blue
Perfect Blue
Ultramarine Blue
Prussian Blue
Royal Blue
Auto Body Blue
Blue Groundwork

IVORY AND YELLOWS

Ivory
Sulphur
C. P. Chrome Yellow, Light
C. P. Permanent Yellow
C. P. Chrome Yellow, Medium
C. P. Chrome Yellow, Orange
C. P. Chrome Yellow, Deep
Orange
Golden Ochre
Old Gold

BROWNS

London Smoke
Golden Brown
Amber Brown
Raw Sienna
Burnt Sienna
Raw Umber
Burnt Umber
Vandyke Brown

REDS

English Rose Lake
Venetian Red
Vermilion
Gear Red, Light
Gear Red, Dark

Auto Body Red, Light
Auto Body Red, Dark
Coach Painters' Red
Special Carmine
No. 40 Carmine
Tuscan Red
Maroon
Light Red Groundwork
Dark Red Groundwork

GREENS

Lemon Green
Bright Olive
Bronze Green
Pullman Car Color
Pea Green
Kentucky Green
Milori or C. P. Chrome Green, Light
Milori or C. P. Chrome Green, Medium
Milori or C. P. Chrome Green, Dark
Coach Painters' Green
Light Quaker Green
Light Brewster Green
Dark Brewster Green

PITTSBURGH PLATE GLASS COMPANY

PITCAIRN COLORED RUBBING VARNISHES

In the manufacture of Colored Rubbing Varnishes, only pure Colors and best Auto Rubbing and Mixing Varnishes are used. This insures clean, clear, and brilliant tints under the Finishing Varnish.

The stock shades of Colored Rubbing Varnishes are: Extra Black, Black, Gray, Blue, Yellow, Green, and Red.

Sizes—Gallon, half-gallon, and quart cans.

The automobile painter may make his own color varnishes, mixing his actual requirements from day to day. This will insure fresh stock always. By use of Pitcairn Japan Colors and Quick Rubbing Varnish complete satisfaction becomes a certainty.

TO MAKE COLORED RUBBING VARNISHES

Mix the following quantity of the various colors with Pitcairn Rubbing Varnishes in quantities depending upon the desired density of color.

Blacks—Mix one and one-half pounds of color to the gallon of Varnish.

Grays—Mix three to four pounds of color to the gallon of Varnish.

Blues—Mix two to three pounds of color to the gallon of Varnish.

Yellows—Mix four pounds of color to the gallon of Varnish.

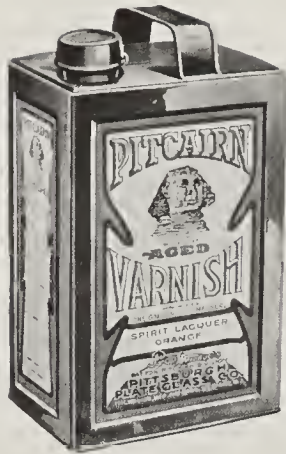
Browns—Mix three pounds of color to the gallon of Varnish.

PITCAIRN SYSTEM FOR BODY FINISHING

	FOUR-DAY SYSTEM (FOR QUICK COMMERCIAL WORK)	SIX-DAY SYSTEM	EIGHT-DAY SYSTEM
FIRST DAY	One coat Pitcairn Elastic Pigment Primer	One coat Pitcairn Elastic Pigment Primer	One coat Pitcairn Elastic Pigment Primer
SECOND DAY	Two coats Pitcairn Sanding Surfacer	Two coats Pitcairn Sanding Surfacer. Brush first coat; knife second coat	Two coats Pitcairn Rough Stuff. Knife second coat
THIRD DAY	Sand out. One coat Japan Color thinned with Turpentine. One coat Color Rubbing Varnish	Sand out. One coat Japan Color thinned with Turpentine. One coat Color Rubbing Varnish	Two coats Pitcairn Rough Stuff
FOURTH DAY	Rub lightly. One coat Pitcairn Finest Auto Wearing Body Varnish	One coat Pitcairn Quick Rubbing Varnish	Rub out. One coat Japan Color thinned with Turpentine. One coat Color Rubbing Varnish
FIFTH DAY		Dry	Dry
SIXTH DAY		Rub out. One coat Pitcairn Finest Auto Wearing Body Varnish	One coat Pitcairn Extra Pale Rubbing Varnish
SEVENTH DAY			Dry
EIGHTH DAY			Rub out. One coat Pitcairn Finest Auto Wearing Body
TOTAL:	SIX COATS	SEVEN COATS	NINE COATS

If metal shows signs of rust, sandpaper and wash with naphtha and apply one coat of Pitcairn Transparent Sealer under the Pitcairn Elastic Pigment Primer. This seals in the rust and makes an elastic and adhesive coat which will insure against peeling from oxidized spots.

PROOF PRODUCTS



PITCAIRN SPIRIT LACQUER

Pitcairn Spirit Lacquer is a Spirit Varnish intended to do the work of Shellac for first coating, sealing, and priming purposes. It is made of carefully selected Fossil Gum and high-proof Alcohol. Pitcairn Spirit Lacquer can be used for brush, spray, or dip work with satisfaction. It dries and works similar to Shellac and insures an important saving in the cost of the finished job, as compared with Shellac Varnish.

Pitcairn Spirit Lacquer works freely and easily under the brush, making it suitable for use on large surfaces. It does not raise the grain and leaves a transparent film slightly heavier than Shellac. Spirit Lacquer sands readily and with little labor. It dries to handle in thirty minutes and is ready to varnish over or to sand in two hours. Spirit Lacquer can be used as a sealer for bleeding Stains as well as under Varnish. It mixes readily with Shellac.

Sizes—Barrels; five-gallon, gallon, and quart cans.

PITCAIRN LEPTYNE

For Thinning and Reducing All Kinds of Paints

Leptyne has a flash-point equal to that of Turpentine; therefore is equally safe to use. The minimum flash-point is guaranteed to be ninety-five degrees Fahrenheit, closed test.

The evaporation is one hundred per cent. This takes place slowly, permitting the painter to secure the maximum spreading and flowing qualities, obtaining greater penetration, and thus assuring the two greatest essentials—life and economy.

The supply of Turpentine is gradually diminishing while the demand for paint thinners increases. Leptyne has been on the market for more than ten years, during which time the demand has increased steadily. It has the indorsement of, and is used regularly in many of the best shops and by large manufacturers who test all new materials most thoroughly before adopting them. Because, for all paint purposes, Leptyne is fully equal to Turpentine (for some work it is superior), paint-users will find it well worth while to give it a regular place in their paint shops.

Sizes—Steel barrels and five-gallon cans.



PITCAIRN PAINT AND VARNISH REMOVER

A double-quick, double-power Remover for removing Paint, Enamel, Varnish, Shellac, Wax, and Gums. A great work-saver and time-saver. Pitcairn Remover will penetrate and soften several coats of old Paint, Varnish, Shellac, Wax, or Gums, so that they may easily be removed from the surface with scrapers or with a benzine cloth and with no necessity for hurrying. The Pitcairn Remover keeps the material soft until the user is ready to take it off, and when cleaned the surface will be ready for refinishing.

NOTE: Pitcairn Remover contains no strong acids and therefore will not injure the hands.

Sizes—Gallon, half-gallon, quart, pint, and half-pint cans.



MANHATTAN VARNISHES

This is an inexpensive line of Varnish intended for the cheaper grades of work and is sold principally in bulk. Packed in barrels and in five-gallon and one-gallon cans.

LIST OF MANHATTAN BULK VARNISHES

Oxford Light Hard Oil Finish, Light Oil Finish, House Painters' Japan, B Japan Drier, Extra Gloss Oil, No. 1 Furniture Varnish, Pure Egyptian Asphaltum, Egyptian (B) Asphaltum, Ceiling or Sizing Varnish, Arabian Iron Enamel.

PITTSBURGH PLATE GLASS COMPANY



PITCAIRN BANZAI ENAMEL

For All White Work

For specifications for use, see Nos. 84 to 87, on page 95

For examples of results, see pages 98, 99, 103, 104, 105, 106, 107, 108, 109, 112, 115, 116, 117, 118

THIS is the finest quality White Enamel. Its remarkable elasticity and durability make it suitable for all kinds of work, inside and out, in all climates.

A distinctive characteristic of Banzai is its wonderfully free, easy-working, and easy-flowing quality. It levels out perfectly, leaving no laps or brush marks, resulting in a finish that is as smooth, brilliant, and immaculately white as fine china. The superior covering properties of Banzai Enamel insure a perfect finish with fewer coats. Banzai Enamel is the most economical of all white interior decorative materials, because of its long life. It will retain its toughness and elasticity for many years. Even though the finish become soiled the film will still remain and another coat may be applied without removing the old coatings.

Because of the smoothness and hardness of the Banzai Enamel film, it does not absorb dirt and grease. Woodwork is therefore very easily cleaned.

The great spreading capacity of Banzai Enamel insures an economical square-yard cost.

Banzai Enamel is made in High-Gloss and Egg-Shell finish.

For preparing the surface, use Banzai Double-Cover Undercoater over Tector Primer.

Banzai Enamel may be tinted by using Patton's Pure Oil Colors.

Banzai Double-Cover Undercoater is made especially for use with Banzai Enamel. It will insure a most satisfactory and lasting job of Enamel finishing.

Sizes—Gallon, half-gallon, quart, pint, and half-pint cans.

PROOF PRODUCTS



PITCAIRN TECTOR

*The Great Undercoater—A Tough and Durable
Primer, Filler, and Surfacer*

TECTOR is a filler and first-coater, neutral in color, for general priming purposes. The pigments are transparent and ground to minute fineness. Tector is made in heavy liquid form and must always be reduced with Leptyne, Turpentine, or Benzine. It dries with a permanent elasticity, producing a coating as tough as whalebone.

Tector can be successfully used for the priming coat on wood, galvanized iron, cement, metal, brick, plaster, burlap, or canvas; under paint, varnish, enamel, and wax; on both exterior and interior work. There is no substitute for Tector, and no other primer or first-coater will produce similar results.

Tector is a distinct and radical departure from the commonly-known liquid fillers or undercoat materials. The idea that anything is good enough for a priming coat is decidedly wrong; it is of the greatest importance that the proper material be used for the purpose.

To prevent collapse, the foundation of any building must be carefully and scientifically planned and constructed. A building will not stand after the foundation gives way; so it is with Varnish, Enamel, or Paint. No finishing material can be more durable or permanent than the priming coat. The use of ordinary Liquid Fillers, Shellacs, and similar undercoaters definitely limits, because of their brittleness, the durability of the finishing material applied over them. Liquid Filler is composed of inert pigments and a resinous binder. It does not penetrate, but dries quickly on the surface. It is extremely brittle, consequently its use limits the permanence of the finished job. Shellac has its value in some classes of work, but also is brittle, impervious, and resinous. Shellac should not be used under finishing material that must

withstand wear and weather or is subjected to abrasion. Use Tector—it will add to the durability of the finish. Because of its great toughness it will prevent cracking, checking, or peeling.

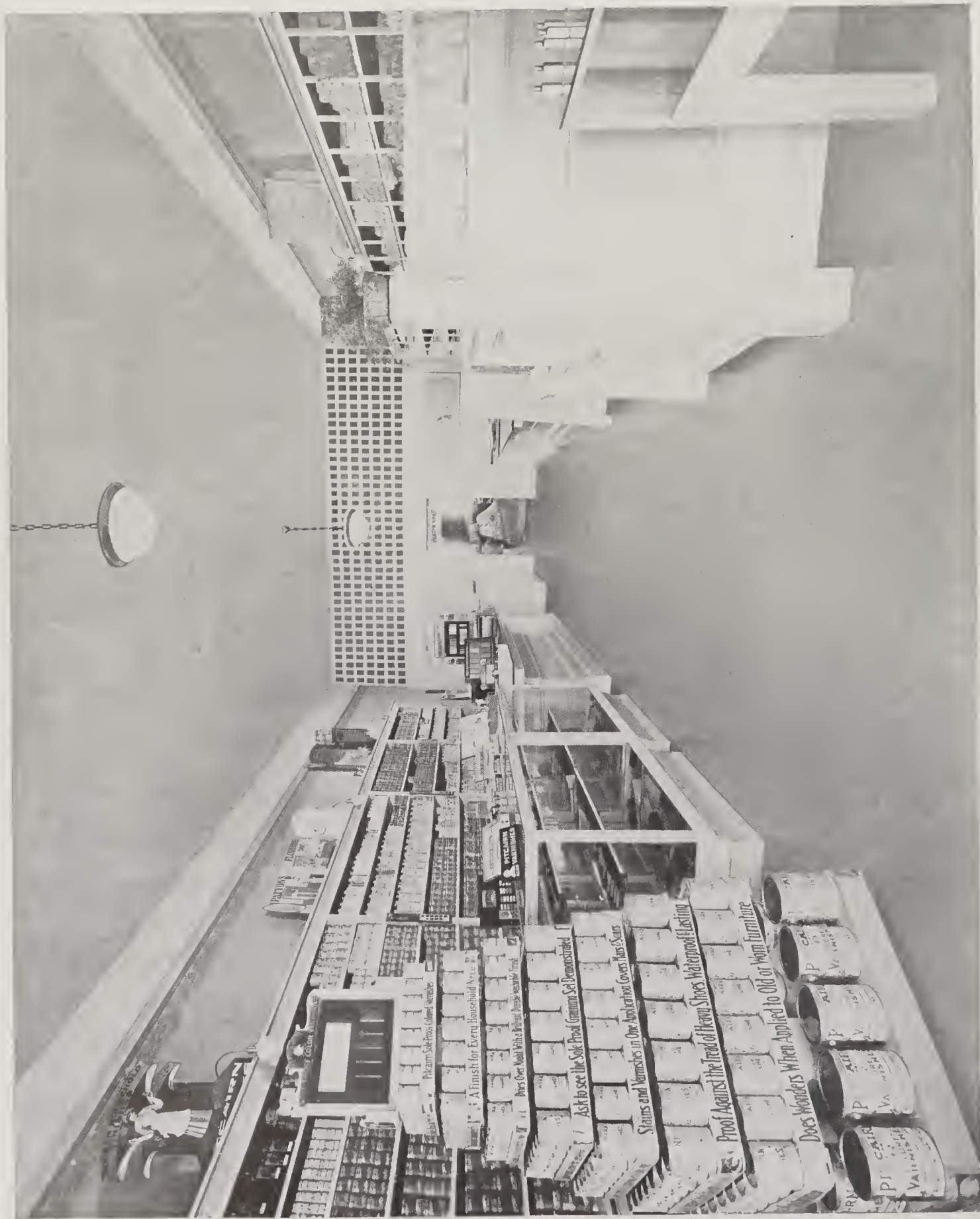
Tector is an excellent material to use in connection with first-coat work or the priming coat on houses from the standpoint of both economy and durability. We recommend for this work that it be mixed with the paint twenty-five to thirty-three and a third per cent. It is used in this manner by many exacting Master Painters. Tector penetrates and fills the wood, producing a firm and lasting foundation for Paint or Varnish coats. Tector is unexcelled as a cypress sealer, whether used clear, under paint or varnish, or in combination with the first coat of paint.

Because of its toughness and elasticity, Tector makes an ideal coat to apply over so-called “chronic peelers.” Brittle paint surfaces, that have a tendency to peel no matter what is applied over them, frequently have been put in shape through the use of Tector and no further trouble has been experienced.

Because of its elasticity and toughness, Tector is an ideal material to apply to canvas surfaces which are later to be painted, as, for example, boat decks. It effectively stops all suction, is waterproof, and keeps the surface elastic and pliable.

Since the priming coat is the weakest link, why not build for permanence by starting with the right foundation? It is wrong to apply a high-grade Enamel or Finishing Varnish over cheap, brittle, lifeless undercoaters. The use of Tector insures the right foundation.

Sizes—Barrels; five-gallon, gallon, half-gallon, quart, and pint cans.



A Model Paint Store, Showing Display of Pitcairn Products

THE PITCAIRN PROPOSITION FOR DEALERS

THE merchandising plan for the Pitcairn Products begins its effective work as soon as the Varnishes are in the dealer's stock. All the resources of our great organization—scientific research, modern methods in manufacture, thorough testing, as well as our selling and advertising activities—are marshaled and directed to keep Pitcairn Products moving from the dealer's shelves to satisfied users.

Pitcairn Products are manufactured in three splendid, modernly equipped plants, one located at Newark, New Jersey, one at Milwaukee, Wisconsin, and the other at Portland, Oregon.

The dealer who sells Pitcairn Aged Varnishes is, in reality, the representative of a highly-skilled, well-trained organization of specialists. The requirements for quality in all raw materials are most exacting and resolutely enforced, each of the manufacturing processes is carefully watched and guarded, and the finished product is subjected to rigid tests. Thus are Pitcairn Aged Varnishes produced. With every element of uncertainty eliminated, the dealer recommends Pitcairn Aged Varnishes to his customers with the well-grounded assurance that the Varnishes are of the very highest character, and with the certainty of absolute uniformity and dependability.

Small but well-assorted stocks—more sales and greater profits through frequent turnover—are characteristic of the Pitcairn Dealers. Supplies are quickly obtained from the nearest of our many distributing Warehouses. These distributing Warehouses are located in principal jobbing centers throughout the country, and extend to the dealer's own locality all advantages of factory stock and service. The Pitcairn Dealer's investment is reduced, the long, expensive delays incident to shipments made from great distances are eliminated, and freight costs are minimized.

Representatives of our Sales Department are always on the alert to be of service to Pitcairn Dealers. They effectively co-operate with our

dealers in applying our merchandising plans for increasing dealers' sales. By means of the contact thus maintained, our manufacturing and distributing proceed in accordance with the requirements of the trade.

Absolute control of production, including the supply of many of the raw materials, through the operation of our own factories, and of marketing through the Company's distributing Warehouses, assures the dealer of constant and permanent supply.

Pitcairn Aged Varnishes have been kept constantly before the favorable notice of the buying public by consistent and effective advertising. Our advertising is designed to facilitate the sale of Pitcairn Aged Varnishes through dealers, who are equipped with numerous attractive store-display features, color cards, price lists, booklets, descriptive literature, and other Dealers' Helps. Pitcairn Dealers are supported also by a great National Advertising Campaign which is making household words of the names of the principal Pitcairn Products.

This campaign includes advertising in magazines of national circulation, and reaches millions of readers. It has created and is maintaining in every locality a consumer demand to be supplied by Pitcairn Dealers. Ready acceptance by the consumer of the nationally advertised Pitcairn Aged Varnishes contributes substantially to the increased sales and greater profits of the Pitcairn Dealer.

The Pitcairn Aged Varnish Line is compact and complete. It includes no duplicates or unnecessary items. It supplies all requirements of the trade for Architectural Varnishes, Driers and Japans, Enamels, Colored Varnishes, Wood Stains, Auto Varnishes, Japan Colors, and such specialties as Bronzing Liquids, Sizing Liquids, Mixed Bronzes, Spirit Lacquer, and Leptyne. Each line and item is representative of Pitcairn Quality and especially prepared to produce the particular kind of finish or effect for which it is designed.



DRESS ten men in uniform and march them down the street and you will have everybody asking questions—because ten men dressed alike are conspicuous. They have the mass formation that catches the eye and commands attention.

You get the same result from a stock of Proof Paint Products. Every can wears a similar uniform. The same general design gives every product a family resemblance. Of course, each product has an individuality of its own, but, in general design, every label resembles the label on every other Proof Paint Product.

Universal Labels make a dealer's paint stock look distinctive, attractive, unusual. They give the entire line the appearance of being systematically selected and actually complete in all details.



THUS the confidence of customers is won. By this means they are impressed with the fact that the Proof Paint Products dealer is handling paints as one of the main items of his stock. One has only to glance at the labels reproduced on this page to picture to himself the mass-formation effectiveness, the individuality, and the distinctiveness they impart to a paint stock.

Remember this—that every time a dealer sells one Proof Paint Product he familiarizes the customer with the general package design of every other product. Thus he teaches his customers that, represented in the Proof Products line, there is a paint for every purpose.

Universal Labels, like the men in uniform, command attention and win prestige for the dealer as conducting “The Store for Paint.”



PITTSBURGH PLATE GLASS COMPANY

QUANTITIES IN WHICH PAINTS AND VARNISHES ARE ORIGINALLY PACKED

PAINTS

Each size packed in a separate case

LIQUID PAINTS

6 one-gallon cans. 12 half-gallon cans. 24 quarter-gallon cans. 48 eighth-gallon cans. 48 sixteenth-gallon cans. 100 thirty-second-gallon cans.

PASTE PAINTS

100 one-pound cans. 20 five-pound cans. 8 twelve and one-half pound cans. 4 twenty-five pound cans.

PATTON'S OIL COLORS

Besides the regular Paste Paint packing, the following oil colors are packed in cases of 5 five-pound, or 25 one-pound cans each (and colors started also in cases of 50 half-pound or 50 quarter-pound cans each):

Prussian Blue*, Ultramarine Blue*, Cobalt Blue*, English Rose Lake, English Rose Pink, American Vermilion, Tuscan Red, Turkey Red, Oriental Permanent Red (light and medium), Sun-Proof Vermilion. All shades of Bulletin Colors.

PITTSBURGH OIL COLORS

Besides the regular Paste Paint packing, the following colors are packed in cases of 5 five-pound, or 25 one-pound cans each (and Prussian Blue also in cases of 50 half-pound or 50 quarter-pound cans each):*

Prussian Blue*, English Rose Lake, English Rose Pink, American Vermilion, Tuscan Red, Turkey Red.

PASTE FILLER

Besides the regular Paste Paint packing, the following are packed 5 five-pound and 25 one-pound cans to the case:

Golden Oak (light and medium), Mahogany.

DISTEMPER COLORS

50 one-pound jars per case.

CRACK PACK

48 one-pound cans. 12 five-pound cans.

17th CENTURY FLOOR WAX

60 one-pound cans. 30 two-pound cans. 12 five-pound cans.

SUN-BRIGHT FURNITURE POLISH

6-ounce bottles—2 cartons, 12 bottles each, per case.

10-ounce bottles—2 cartons, 12 bottles each, per case.

VARNISHES

Each size packed in a separate case

PITCAIRN AGED SPAR LINE

1 five-gallon can per half-case. 12 one-gallon cans. 12 half-gallon cans. 24 quarter-gallon cans. 48 eighth-gallon cans.

PITCAIRN PAINT AND VARNISH REMOVER AND EMPIRE LINE

1 five-gallon can per half-case. 12 one-gallon cans. 12 half-gallon cans. 24 quarter-gallon cans. 48 eighth-gallon cans. 48 sixteenth-gallon cans.

PITCAIRN WOOD STAIN

6 one-gallon cans. 12 half-gallon cans. 24 quarter-gallon cans. 48 eighth-gallon cans. 48 sixteenth-gallon cans.

PITCAIRN AGED AUTO AND CARRIAGE VARNISH

1 five-gallon can per half-case. 6 one-gallon cans. 12 half-gallon cans. 24 quarter-gallon cans. 48 eighth-gallon cans.

TECTOR

12 one-gallon cans. 12 half-gallon cans. 24 quarter-gallon cans. 48 eighth-gallon cans.

PITCAIRN WATERSPAR COLORED VARNISH AND ENAMEL

6 one-gallon cans. 12 half-gallon cans. 24 quarter-gallon cans. 48 eighth-gallon cans. 48 sixteenth-gallon cans. 100 thirty-second-gallon cans.

No. 1 and No. 2 Gold and Aluminum, 144 to a case. 12 cartons, 12 cans each per case.

No. 3 and No. 4 Gold and Aluminum, 48 to a case. Waterspar Grainers, 6 dozen to a case.

*Transparent Waterspar packed same as Spar Line.

BANZAI ENAMEL

12 one-gallon cans. 12 half-gallon cans. 24 quarter-gallon cans. 48 eighth-gallon cans. 48 sixteenth-gallon cans.

BANZAI DOUBLE-COVER UNDERCOATER

6 one-gallon cans. 12 half-gallon cans. 24 quarter-gallon cans. 48 eighth-gallon cans. 48 sixteenth-gallon cans.

SPECIFICATIONS FOR USE OF PROOF PRODUCTS

Prepared for the Use of Architects and Decorators

IN THE following pages will be found complete and detailed specifications for the use of PROOF PRODUCTS. These specifications are as complete as it is possible to make them and here will be found exact information on how to use any Paint or Varnish product described in the preceding pages of this book.

Specifications shown cover the use of Paints and Varnishes for new and old work on surfaces of all kinds, exterior and interior; on woods of all kinds; tin, steel, iron, and galvanized iron; stucco, plaster, cement, brick, and wallboard.

HOW TO USE THESE SPECIFICATIONS

These specifications can be used word for word, making this section of this book a valuable aid to the Specification Department.

A reference to the Index will disclose the Specification number referring to the particular kind of finish desired, as, for example: "Oak wood, Mission effect, four-coat work (41), 86." The number in parenthesis in the Index is the Specification number; the second number is the page. A reference to *Specification No. 41*, on page 86, will give complete information as to how to obtain the Mission effect on Oak, and all that will be necessary is to have the stenographer copy *Specification No. 41*.

The Paint and Varnish Division of the Pittsburgh Plate Glass Company is prepared to furnish panels showing results obtained by following the various specifications given, and will gladly send them to any architect on request, either direct or through a Pittsburgh Plate Glass Company salesman.

Our Paint and Varnish Advisory Board, if called into consultation, will be very glad to assist any architect in the solving of any peculiar and unusual problems that may arise.

The Paint and Varnish Division of the Pittsburgh Plate Glass Company is most desirous to co-operate with all architects and decorators, to insure quality work through the use of its products. Close attention to the detailed specifications will insure the best possible results from the use of Proof Paint and Varnish Products.

PITTSBURGH PLATE GLASS COMPANY

SPECIFICATIONS

Specification No. 1—General:

(a) Unless otherwise specified, the contractor or painter shall furnish all materials, provide labor, transportation, scaffolding, and all other essential equipment, and shall assume all liability of every character whatsoever in connection with the work.

(b) Care shall be taken that surface to be finished is thoroughly dry before applying any coating whatever.

(c) No ochre shall be used for priming.

(d) All finger marks, dirt, grease, or other objectionable matter shall be carefully removed by the painter before commencing to fill, varnish, or paint.

(e) The work shall be carried on continuously except for delays due to unfavorable weather and the time allowed for proper drying between coats.

(f) In painting new work all knots and sappy places shall be coated with shellac before priming, care being taken to cover completely without spreading over more of the surrounding surface than is necessary.

(g) In painting new work, all cracks and nail holes shall be filled with putty after the priming coat.

(h) On a varnish job, putty shall match the wood after the coat of filler is applied.

(i) On plaster work, all cracks which can be filled with putty shall be filled with soft putty made of equal parts plaster of Paris and flour before applying priming coat. A putty which will give excellent results can be made from *Patton's Velumina* stiffened with whiting. Edges of cracks shall be sealed with a good varnish to prevent absorption of oil by plaster. When too large for puttying, they shall be carefully plastered. No painting shall be done until plaster is thoroughly dry.

(j) No painting or varnishing of outside work will be allowed in wet or freezing weather, nor of inside work except where the building can be properly heated to at least 65 degrees Fahrenheit.

(k) On old paint the surface shall be first brushed with a wire brush and where it is scaling badly shall be scraped or burned off.

(l) All paint is to be well brushed out, and all paint, enamel, varnish, stain, and filler to be applied in a workmanlike manner, and as furnished by the manufacturer, without any thinning or addition whatever, except as noted on direction label. Care shall be taken to keep paint properly stirred.

(m) All materials shall be brought on the job in manufacturer's original package. Paints and enamel shall be thoroughly stirred before, and kept at a uniform consistency during application.

PAINTING EXTERIOR WOODWORK

Specification No. 2:

(a) All exterior woodwork (except as otherwise specified) shall be painted with three coats of

Patton's Sun-Proof Paint, color selected by the architect, as follows:

(b) Priming coat shall be *Patton's Sun-Proof Paint*, same color as final coat, reduced with three pints of pure raw linseed oil and one pint turpentine to each gallon of paint. On cypress, cedar, and redwood use priming mixture of one gallon *Patton's Porchite*, one quart *Pitcairn Tector*, and one pint turpentine.

(c) Second coat shall be *Patton's Sun-Proof Paint*, same color as final coat, reduced with one pint *Leptyne* or turpentine to each gallon of paint.

(d) Third coat shall be *Patton's Sun-Proof Paint* of the color selected by the architect, and used as furnished by the manufacturer without any thinning or addition whatever.

REPAINTING

Specification No. 3:

(a) On old paint the surface shall be first brushed with a wire brush and where it is scaling badly shall be scraped or burned off.

(b) All exterior woodwork shall receive two coats of *Patton's Sun-Proof Paint* as follows:

(c) First coat shall be *Patton's Sun-Proof Paint* of the color selected, reduced with one quart of pure raw linseed oil and one pint of *Leptyne* or turpentine to each gallon.

(d) Second coat shall be *Patton's Sun-Proof Paint* as it comes in the can.

PAINTING PORCH FLOORS AND DECKS

Specification No. 4:

(a) All porch floors shall be painted with three coats of *Patton's Porchite*, the color to be selected by the architect, as follows:

(b) Priming coat shall be *Patton's Porchite*, same color as final coat, reduced with three pints of pure raw linseed oil, one pint turpentine, and one pint of *Compo Drier* to each gallon of paint. On cypress, yellow pine, and fir use priming mixture of one gallon *Patton's Porchite*, one quart *Pitcairn Tector*, and one pint turpentine.

(c) Second coat shall be *Patton's Porchite* of the same color as final coat, reduced with one pint of *Leptyne* or turpentine to each gallon of paint.

(d) Third coat shall be *Patton's Porchite* of the same color selected by the architect, and used as furnished by the manufacturer.

REPAINTING

Specification No. 5:

(a) See *Specification No. 1 (k)*.

(b) All porch floors shall be painted with two coats of *Patton's Porchite*, as follows:

(c) First coat shall be *Patton's Porchite* of the color selected, reduced with one quart of raw linseed oil, one pint of *Leptyne* or turpentine, and one pint of *Compo Drier* to each gallon.

PROOF PRODUCTS SPECIFICATIONS

(d) Second coat shall be *Patton's Porchite* as it comes in the can.

PAINTING ROOFS

SHINGLE ROOFS

Specification No. 6:

(a) All shingles shall be dipped full length in *Patton's Tor-on Shingle Stain* of the color selected by the architect, before being laid.

(b) After laying, follow with a brush or spray coat of *Patton's Tor-on Shingle Stain*. The addition of one quart of boiled linseed oil to each gallon of Stain is recommended.

REPAINTING

Specification No. 7:

(a) Apply two brush or spray coats of *Patton's Tor-on Shingle Stain* of color selected by the architect. The addition of one quart of boiled linseed oil to each gallon of Stain is recommended.

TIN ROOFS, LEADERS, GUTTERS

Specification No. 8:

(a) Wash with benzine to remove dirt and grease, then finish according to the following:

(b) First coat shall be *Pitcairn Tector* reduced with one quart of *Leptyne* or turpentine per gallon.

(c) Second coat shall be *Patton's Inhibitive Red Ironhide* as it comes in the can. At least forty-eight hours must be allowed for drying.

(d) Third coat shall be *Patton's Ironhide Finishing Green* or *Brown* applied as it comes in the can.

REPAINTING

Specification No. 9:

(a) All rust and loose paint must be removed by wire-brushing or scraping. All bare spots are to be touched up with *Patton's Inhibitive Red Ironhide*, and after three days the entire surface coated with *Patton's Finishing Green* or *Brown Ironhide*.

NOTE: If a red color is desired, apply two coats of *Patton's Red Ironhide*.

PAINTING IRON AND STEEL

Specification No. 10:

(a) The surface to be painted must be free from oil, grease, scale, and rust. Rust and scale must be removed by wire-brushing, scraping, or sandblast; grease, by use of gasoline or benzine.

(b) All paint must be well brushed and nothing larger than a three-inch oval brush used in applying.

(c) No paint is to be applied at a temperature below 50 degrees Fahrenheit, in damp or rainy weather, or to a damp or wet surface.

(d) The first coat shall be *Patton's Inhibitive Red Ironhide* as it comes in the container. Allow at least three days for drying.

(e) The second coat shall be *Patton's Brown Ironhide* or a mixture of equal parts of *Inhibitive Red* and *Finishing Black Ironhide*.

(f) The third coat shall be *Patton's Finishing Black* or *Green Ironhide* as it comes in container.

REPAINTING

Specification No. 11:

(a) All rust and loose paint must be removed by wire-brushing or scraping, then finished as follows:

(b) First coat shall be *Patton's Inhibitive Red Ironhide* as it comes in the can. At least forty-eight hours must be allowed for proper drying.

(c) Second coat shall be *Patton's Finishing Black Ironhide* as it comes in the can.

GALVANIZED IRON

Specification No. 12:

(a) Wash all new galvanized iron, interior and exterior, and metal ceilings, with a solution of five ounces of blue vitriol in one gallon of water. If it has been allowed to weather, washing will be unnecessary.

(b) Apply one coat of a mixture of four parts of *Tector* and one part of *Leptyne*, turpentine, or benzine. Allow eighteen hours for drying.

(c) Second coat shall be *Patton's Inhibitive Red Ironhide* as it comes in the can.

REPAINTING

Specification No. 13:

(Same as *Specification No. 11.*)

PAINTING STUCCO, BRICK, CEMENT, AND CONCRETE

EXTERIOR OR INTERIOR

FLAT FINISH

Specification No. 14:

(a) Surface to be painted must be clean and dry. All dirt and loose particles must be removed with a wire brush or stiff broom.

(b) First coat shall be *Cementhide Priming Liquid* as it comes in the can. When a dark surface is to be repainted, add one-quarter gallon of *Cementhide* of desired shade to each gallon of *Cementhide Priming Liquid*.

(c) Second coat shall be a mixture in the proportion of one gallon of *Cementhide* to one quart of *Cementhide Priming Liquid*.

(d) Third coat shall be *Cementhide* as it comes in the can. If too heavy for easy brushing, reduce with *Leptyne* or turpentine not to exceed one pint to each gallon of paint.

(e) Allow forty-eight hours' drying between coats.

REPAINTING

Specification No. 15:

(a) Surface to be painted must be clean and dry. All dirt and loose particles must be removed with a wire brush or stiff broom.

(b) First coat shall be a mixture in the proportion of one gallon of *Cementhide* to one-half gallon of *Cementhide Priming Liquid*.

(c) Second coat shall be *Cementhide* as it comes in the can. If too heavy for easy brushing, reduce with *Leptyne* or turpentine, not to exceed one pint to each gallon of paint.

(d) Allow forty-eight hours' drying between coats.

PITTSBURGH PLATE GLASS COMPANY

INTERIOR BRICK AND CEMENT FLOORS—GLOSS FINISH

Specification No. 16:

(a) First coat shall be one of *Cementhide Priming Liquid* as it comes in the can.

(b) Second and third coats shall be *Patton's Florhide Enamel* as it comes in the can. If too heavy for easy brushing, reduce with *Leptyne* or turpentine not to exceed one pint to each gallon of *Florhide Enamel*.

REPAINTING

Specification No. 17:

(a) First coat shall be *Patton's Florhide Enamel*. If too heavy for easy brushing, reduce with *Leptyne* or turpentine not to exceed one pint to each gallon.

(b) Second coat shall be *Patton's Florhide Enamel* as it comes in the can.

EXTERIOR STUCCO, BRICK, CEMENT, AND CONCRETE WALLS—GLOSS FINISH

Specification No. 18:

(a) First coat shall be *Patton's Cementhide Priming Liquid* as it comes in the can.

(b) Second coat shall be *Patton's Sun-Proof Paint* reduced with a quart of *Cementhide Priming Liquid* to each gallon.

(c) Third coat shall be *Patton's Sun-Proof Paint* as it comes in the can.

REPAINTING

Specification No. 19:

(a) First coat shall be a mixture of equal parts of *Cementhide Priming Liquid* and *Patton's Sun-Proof Liquid Paint*.

(b) Second coat shall be *Patton's Sun-Proof Paint* as it comes in the can.

EXTERIOR BRICK WALLS

Alternate for Specification No. 18

Specification No. 20:

(a) All exterior brick walls shall be painted with three coats of *Patton's Sun-Proof Paint*, color selected by the architect, as follows:

(b) Priming coat shall be *Patton's Sun-Proof Paint*, same color as final coat, reduced with three pints of pure raw linseed oil and one pint of *Leptyne* or turpentine to each gallon of paint.

(c) Second coat shall be *Patton's Sun-Proof Paint*, same color as final coat, reduced with one quart of linseed oil and one pint of *Leptyne* or turpentine to each gallon of paint.

(d) Third coat shall be *Patton's Sun-Proof Paint* as it comes in the can.

REPAINTING

Alternate for Specification No. 19

Specification No. 21:

(a) The first coat shall be *Patton's Sun-Proof Paint* reduced with one quart of raw linseed oil and one pint of *Leptyne* or turpentine to a gallon.

(b) Second coat shall be *Patton's Sun-Proof Paint* as it comes in the can.

EXTERIOR WOOD FINISHES OAK AND ASH WOODS

Specification No. 22:

VARNISH FINISH—FIVE-COAT WORK

(a) All Oak and Ash Woods (locations designated) shall receive a coat of *Patton's Natural Paste Wood Filler*, properly reduced with *Leptyne*, turpentine, or benzine, brushed well into the grain. (The excess of Filler must be carefully and neatly cleaned from the surface by rubbing across the grain.)

(b) Care must be taken that all grooves and corners are well cleaned with a hardwood stick. Fill all nail holes with putty tinted to match finish.

(c) The surface shall then receive a coat of *Pitcairn Tector* reduced gallon for gallon with *Leptyne* or turpentine. After twenty-four hours, sand carefully.

(d) Apply three coats of *Pitcairn Aged Mast Spar Varnish*, allowing at least forty-eight hours between coats for drying. Sand lightly between Varnish coats with No. 0 paper.

(e) To obtain a high-polished finish—rub the last coat of Varnish with pumice stone and water, then bring to a high polish with rotten stone and water or crude oil, and wipe off absolutely clean.

BIRCH, PINE, CYPRESS, AND FIR WOODS

Specification No. 23:

VARNISH FINISH—FOUR-COAT WORK

(a) All Birch, Pine, Cypress, and Fir Woods (locations designated) shall receive a coat of *Pitcairn Tector* reduced according to directions on the can with *Leptyne*, turpentine, or benzine. After twenty-four hours, sandpaper carefully. Fill all nail holes with putty tinted to match the finish.

(b) Apply three coats of *Pitcairn Aged Mast Spar Varnish*, allowing at least forty-eight hours between coats for drying. Sand lightly between Varnish coats with No. 0 paper.

PAINTING INTERIOR WOODWORK GLOSS FINISH

Specification No. 24:

(a) All interior woodwork shall be painted with three coats of *Patton's Sun-Proof Paint*, as follows:

(b) The first coat shall be *Patton's Sun-Proof Paint* reduced with three pints of raw linseed oil and one pint of *Leptyne* or turpentine to each gallon.

(c) The second coat shall be *Patton's Sun-Proof Paint* reduced with one pint of *Leptyne* or turpentine to each gallon.

(d) The third coat shall be *Patton's Sun-Proof Paint* as it comes in the can.

REPAINTING

Specification No. 25:

(a) First coat shall be *Patton's Sun-Proof Paint* reduced with one quart of linseed oil and one pint of *Leptyne* or turpentine to each gallon of paint.

PROOF PRODUCTS SPECIFICATIONS

(b) Second coat shall be *Patton's Sun-Proof Paint* as it comes in the can.

FLAT FINISH

Specification No. 26:

(a) All interior woodwork shall be painted with three coats of *Patton's Velumina*, color to be selected by the architect, as follows:

(b) The first coat shall be *Patton's Velumina*, same color as final coat, reduced with one quart of raw linseed oil to each gallon of paint.

(c) Second and third coats shall be *Patton's Velumina* as it comes in the can.

REPAINTING

Specification No. 27:

(a) First coat shall be *Patton's Velumina* reduced with one quart of raw linseed oil to each gallon.

(b) Second coat shall be *Patton's Velumina* as it comes in the can.

NOTE: In many cases one coat of *Patton's Velumina* applied as specified in *Specification No. 27 (a)* will prove sufficient.

WHITE ENAMEL FINISH

(See special Enamel specifications, page 95.)

COMMERCIAL, OR MILL WHITE INTERIOR FLAT FINISH

OLD OR NEW WORK—WOOD, PLASTER, BRICK, OR CEMENT

Specification No. 28:

(a) The first coat shall be *Patton's Flat Alba-Lux* reduced with a quart of boiled linseed oil to each gallon. Twenty-four hours are to be allowed for drying.

(b) The second coat shall be *Patton's Flat Alba-Lux* as it comes in the package.

REPAINTING WHITE SURFACE

Specification No. 29:

(a) One coat of *Patton's Flat Alba-Lux* as it comes in the can.

NOTE: If surface is in poor condition, use *Specification No. 28 (a)* and *(b)*.

GLOSS FINISH

Specification No. 30:

(a) The first coat shall be *Patton's Flat Alba-Lux* reduced with one quart of boiled linseed oil; forty-eight hours to be allowed for drying.

(b) The second coat shall be *Patton's Alba-Lux Gloss* as it comes in the can.

REPAINTING WHITE SURFACE

Specification No. 31:

(a) One coat of *Patton's Alba-Lux Gloss* as it comes in the package.

NOTE: If surface is in poor condition use *Specification No. 30 (a)* and *(b)*.

WALLS—NEW OR OLD WORK

PLASTER—FLAT EFFECT

Specification No. 32:

(a) Preparation of surface: Wash or scrape off all calcimine, loose paint, dirt, grease, etc. Smooth or glossy paint shall be roughened with steel wool or sandpaper. Fill cracks with a stiff paste made from plaster of Paris and flour and allow at least twenty-four hours for drying. Edges of cracks shall be sealed with a good varnish.

(b) The first coat shall consist of *Patton's Velumina* reduced with one-quarter gallon of pure boiled linseed oil except for new and exceedingly porous walls, in which case more satisfactory results will be obtained by using a mixture of one gallon of *Patton's Velumina*, one quart of boiled linseed oil, and one quart *Pitcairn Tector*. Mix only as used, as mixture may thicken on prolonged standing. It is absolutely necessary that boiled oil be used with *Tector* as above directed to insure results. Do not use any *Leptyne*, turpentine, or benzine in first coat under any circumstances, unless to thin mixture of boiled oil and *Tector* slightly. Allow at least twenty-four hours for drying, more time being required in cold or damp weather.

(c) Suction or so-called "hot-spots," which may show up through first coat, shall, when dry, be touched up with first-coat mixture, allowing at least twenty-four hours for drying. Otherwise, these suction spots may appear through the following coat.

(d) To insure perfect results, never apply the finishing coat until first coat presents a uniform surface. Extremely bad walls may require an additional application of the first-coat mixture to accomplish this, or, if preferred, a thin coat of glue size may be applied over the first coat. The use of glue is something that should be attempted only by one thoroughly experienced, as, if too heavy, it is likely to cause peeling later. In general, it is well to avoid the use of glue size wherever possible. Never apply glue or varnish size direct to plaster as it will prevent proper penetration of the paint.

(e) The finishing coat shall be *Patton's Velumina* as it comes in the can. Do not use any of the material left over from the first coat in the finishing coat as it will impair the perfect flatness of *Velumina*. *Velumina* is made heavy in body, but brushes easily and should be flowed on with a wide wall brush. If too heavy, add *Leptyne* or turpentine, not to exceed one-eighth gallon to each gallon of *Velumina*. Never add thinners, however, until a brushing test shows it is necessary; then add very sparingly. After the finishing coat has set for about thirty minutes, it may be stippled if such finish is desired.

NOTE: *Velumina* should be flowed on like a high-grade enamel and not brushed out like a paint.

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WALLBOARD—FLAT EFFECT

Specification No. 33:

See *Specification No. 32*. (Same as for Plaster Walls.)

METAL CEILINGS—FLAT EFFECT

Specification No. 34:

(a) The first coat shall consist of a mixture of four parts of *Tector* and one part of *Leptyne*, turpentine, or benzine. Allow eighteen hours for drying.

(b) The second coat shall be *Patton's Velumina* reduced with one quart of boiled linseed oil to each gallon used.

(c) The third coat shall be *Patton's Velumina* as it comes in the can.

REPAINTING

Specification No. 35:

(a) The first coat shall be *Patton's Velumina* reduced with a quart of boiled linseed oil to each gallon used.

(b) The second coat shall be *Patton's Velumina* as it comes in the can.

PAINTING INTERIOR WOOD FLOORS

Specification No. 36:

(a) Floor shall be painted with three coats of *Patton's Florhide Enamel*, color to be selected by the architect, as follows:

(b) First coat shall be *Patton's Florhide Enamel* reduced with one quart of *Leptyne* or turpentine to each gallon of paint.

(c) Second and third coats shall be *Patton's Florhide Enamel* used as it comes in the can; twenty-four hours' drying time must be allowed between coats.

REPAINTING

Specification No. 37:

(a) First coat shall be *Patton's Florhide Enamel* reduced with one quart of *Leptyne* or turpentine to each gallon of paint.

(b) Second coat shall be *Patton's Florhide Enamel* as it comes in the can.

PAINTING INTERIOR BRICKWORK, PLASTER GLOSS FINISH

Specification No. 38:

(a) The first coat shall be *Patton's Sun-Proof Paint* reduced with one quart of *Cementhide Priming Liquid* to each gallon of paint.

(b) The second coat shall be *Patton's Sun-Proof Paint* as it comes in the can.

REPAINTING

Specification No. 39:

(a) The first coat shall be *Patton's Sun-Proof Paint* reduced with a quart of *Cementhide Priming Liquid* to each gallon of paint.

(b) The second coat shall be *Patton's Sun-Proof Paint* as it comes in the can.

NATURAL WOOD FINISHES

OAK AND ASH

Specification No. 40:

VARNISH FINISH—FOUR-COAT WORK STANDING TRIM

(a) All Oak or Ash Wood (locations designated) shall receive a coat of *Patton's Natural Paste Wood Filler*, properly reduced with *Leptyne*, turpentine, or benzine, and brushed well into the grain. (Excess of Filler must be carefully and neatly cleaned from the surface by rubbing across the grain.)

(b) Care must be taken that all grooves and corners are well cleaned with a hardwood stick. Fill all nail holes with putty tinted to match the wood.

(c) The surface then shall receive a coat of *Pitcairn Tector*, reduced with *Leptyne* or turpentine, one-half gallon to the gallon. After twenty-four hours, sandpaper carefully. Then apply two coats of *Pitcairn Aged Finishing Spar Varnish*, allowing at least forty-eight hours between coats for drying. Sand lightly between varnish coats with No. 0 paper.

(d) For an extra-fine job, apply a third coat of *Pitcairn Aged Finishing Spar Varnish*.

(e) For dull finish—rub the last coat with fine pumice stone and rubbing oil.

(f) For a dull finish without the expense of rubbing, substitute *Pitcairn Aged Flat Finish* for the last Varnish coat.

(g) Apply Flat Varnish freely with a badger-hair or black fitch flowing brush.

Specification No. 41:

MISSION EFFECT—FOUR-COAT WORK STANDING TRIM

(a) All Oak or Ash Wood (locations designated) shall receive a coat of *Patton's Natural Paste Wood Filler*, properly reduced with *Leptyne*, turpentine, or benzine, and brushed well into the grain. (Excess of Filler must be carefully and neatly cleaned from the surface by rubbing across the grain.)

(b) Care must be taken that all grooves and corners are well cleaned with a hardwood stick. Fill all nail holes with putty tinted to match the wood.

(c) The surface shall then receive a coat of *Pitcairn Tector*, reduced with *Leptyne* or turpentine, one-half gallon to the gallon. After twenty-four hours, sandpaper carefully. Apply two coats of *Pitcairn Aged Flat Finish*, flowed on with a badger-hair or black fitch flowing brush to insure a smooth dull finish. Allow at least twenty-four hours between coats for drying.

Specification No. 42:

WAX FINISH—THREE-COAT WORK STANDING TRIM

(a) All Oak or Ash Wood (locations designated) shall receive a coat of *Patton's Natural Paste Wood Filler*, properly reduced with *Leptyne*, turpentine, or benzine, and brushed well into the grain. (Ex-

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cess of Filler must be carefully and neatly cleaned from the surface by rubbing across the grain.)

(b) Care must be taken that all grooves and corners are well cleaned with a hardwood stick. Fill all nail holes with putty tinted to match wood.

(c) Apply a coat of *Pitcairn Tector* reduced with *Leptyne* or turpentine, one-half gallon to the gallon. After twenty-four hours, sandpaper carefully and apply *Patton's Seventeenth Century Wax*, and polish by hand-rubbing.

(d) For an extra-fine job, after allowing a few hours' drying, apply second coat of *Wax* and again polish.

BIRCH AND MAPLE

Specification No. 43:

VARNISH FINISH—THREE-COAT WORK

STANDING TRIM

(a) All Birch or Maple Wood (locations designated) shall receive a coat of *Pitcairn Tector* reduced with *Leptyne* or turpentine, gallon for gallon. After twenty-four hours, sandpaper carefully. Fill all nail holes with putty tinted to match the wood.

(b) Apply two coats of *Pitcairn Aged Finishing Spar Varnish*, allowing at least forty-eight hours' drying between coats. Sand lightly between coats.

(c) If an extra-fine job is desired, apply a third coat of *Pitcairn Aged Finishing Spar Varnish*.

(d) If dull rubbed finish is desired, rub the last Varnish coat.

(e) If a dull finish is desired without the expense of rubbing, substitute *Pitcairn Aged Flat Finish* for the last Varnish coat. Apply Flat Varnish freely with a badger-hair or black fitch flowing brush.

Specification No. 44:

MISSION EFFECT—THREE-COAT WORK

STANDING TRIM

(a) All Birch or Maple Wood (locations designated) shall receive a coat of *Pitcairn Tector* reduced with *Leptyne* or turpentine, gallon for gallon. After twenty-four hours, sandpaper carefully. Fill all nail holes with putty tinted to match the wood.

(b) Apply two coats of *Pitcairn Aged Flat Finish*, flowed on with a badger-hair or black fitch flowing brush to insure a smooth dull finish.

(c) Allow at least twenty-four hours between coats for drying.

Specification No. 45:

WAX FINISH—TWO-COAT WORK

STANDING TRIM

(a) All Birch or Maple Wood (locations designated) shall receive a coat of *Pitcairn Tector* reduced with *Leptyne* or turpentine, gallon for gallon. After twenty-four hours, sandpaper carefully. Fill all nail holes with putty tinted to match wood.

(b) Let stand for eight hours; apply *Patton's Seventeenth Century Wax*; polish by hand-rubbing.

(c) If an extra-fine job is desired, allow a few hours for first coat to dry; apply a second coat of *Wax*, and again polish.

GUM, PINE, FIR, AND REDWOOD

Specification No. 46:

VARNISH FINISH—THREE-COAT WORK

STANDING TRIM

(a) All Gumwood, Pine, Fir, or Redwood (locations designated) shall receive a coat of *Pitcairn Tector* reduced with *Leptyne* or turpentine, one-half gallon to the gallon. After twenty-four hours, sandpaper carefully. Fill all nail holes with putty tinted to match the wood.

(b) Apply two coats of *Pitcairn Aged Finishing Spar Varnish*, allowing at least forty-eight hours' drying between coats. Sand lightly between coats.

(c) If an extra-fine job is desired, apply a third coat of *Pitcairn Aged Finishing Spar Varnish*. If desired, the last coat may be rubbed to a dull finish with fine pumice stone and rubbing oil.

(d) If a dull finish is desired without the expense of rubbing, substitute *Pitcairn Aged Flat Finish* for the last Varnish coat. Apply Flat Varnish freely with a badger-hair or black fitch flowing brush.

Specification No. 47:

MISSION EFFECT—THREE-COAT WORK

STANDING TRIM

(a) All Gumwood, Pine, Fir, or Redwood (locations designated) shall receive a coat of *Pitcairn Tector* reduced with *Leptyne* or turpentine, one-half gallon to the gallon. After twenty-four hours, sandpaper carefully. Fill all nail holes with putty tinted to match the wood.

(b) Apply two coats of *Pitcairn Aged Flat Finish*, flowed on with a badger-hair or black fitch flowing brush to insure a smooth dull finish.

(c) Allow at least twenty-four hours between coats for drying.

Specification No. 48:

WAX FINISH—TWO-COAT WORK

STANDING TRIM

(a) All Gumwood, Pine, Fir, or Redwood (locations designated) shall receive a coat of *Pitcairn Tector* reduced with *Leptyne* or turpentine, one-half gallon to the gallon. After twenty-four hours, sandpaper carefully. Fill all nail holes with putty tinted to match the wood.

(b) Apply *Patton's Seventeenth Century Wax* and polish by hand-rubbing.

(c) If an extra-fine job is desired, allow a few hours for first coat to dry; apply a second coat of *Wax*, and again polish.

GENUINE MAHOGANY

Specification No. 49:

VARNISH FINISH—FOUR-COAT WORK

STANDING TRIM

(a) All Mahogany Wood (locations designated) shall receive a coat of *Mahogany Paste Wood Filler*,

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properly reduced with *Leptyne*, turpentine, or benzine, and brushed well into the grain. (The excess of Filler must be carefully and neatly cleaned from the surface by rubbing across the grain.)

(b) Care must be taken that all grooves and corners are well cleaned with a hardwood stick. Fill all nail holes with putty tinted to match the finish.

(c) The surface shall then receive a coat of *Pitcairn Tector* reduced with *Leptyne* or turpentine, one-half gallon to the gallon. After twenty-four hours, sand carefully.

(d) Apply two coats of *Pitcairn Aged Finishing Spar Varnish*, allowing at least forty-eight hours between coats for drying.

(e) Sand lightly between coats with No. 0 paper.

(f) If an extra-fine job is desired, apply a third coat of *Pitcairn Aged Finishing Spar Varnish*.

(g) For dull finish, rub the last coat with fine pumice stone and rubbing oil.

(h) If a dull finish is desired without the expense of rubbing, substitute *Pitcairn Aged Flat Finish* for the last Varnish coat. Apply Flat Varnish freely with a badger-hair or black fitch flowing brush.

STAINED WOOD FINISHES

NOTE: Soft, porous woods absorb stain more readily than hard, close-grained pieces. Painters will use care and judgment to get uniform effects. When necessary reduce stain with *Leptyne*, turpentine, or naphtha.

OAK WOOD—FLEMISH OR WEATHERED FINISH

Specification No. 50:

MISSION FINISH—FOUR-COAT WORK STANDING TRIM

(a) All Oak Wood (locations designated) shall receive a coat of *Pitcairn No. 1 Flemish Stain*, or *Pitcairn No. 2 Weathered Stain*, the excess being removed with a cloth after sufficient time has elapsed for penetration. Fill all nail holes with putty tinted to match the finish.

(b) After twelve hours, a thin coat of *Pitcairn Spirit Lacquer* or pure gum shellac shall be applied.

(c) Apply two coats of *Pitcairn Aged Flat Finish*, flowed on with a badger-hair or black fitch flowing brush to insure a smooth dull finish. Allow at least twenty-four hours between coats for drying.

(d) Apply only enough Lacquer or shellac to seal the Stain. Avoid a heavy coating.

Specification No. 51:

WAX FINISH—THREE-COAT WORK STANDING TRIM

(a) All Oak Wood (locations designated) shall receive a coat of *Pitcairn No. 1 Flemish Stain*, or *Pitcairn No. 2 Weathered Stain*, the excess being removed with a cloth after sufficient time has elapsed for penetration. Fill all nail holes with putty tinted to match the finish.

(b) After twelve hours, a thin coat of *Pitcairn*

Spirit Lacquer or pure gum shellac shall be applied. Tint the Lacquer or shellac with a little dry lamp-black, being careful to avoid a streaky finish.

(c) Apply *Patton's Seventeenth Century Wax* and polish by hand-rubbing.

(d) If an extra-fine job is desired, allow a few hours for the first coat to dry; apply a second coat of *Wax*, and again polish.

OAK WOOD—FLEMISH OR WEATHERED FINISH WHITE SILHOUETTE EFFECT

Specification No. 52:

MISSION FINISH—FOUR-COAT WORK STANDING TRIM

(a) All Oak Wood (locations designated) shall receive a coat of *Pitcairn No. 1 Flemish Stain*, or *Pitcairn No. 2 Weathered Stain*, the excess being removed with a cloth after sufficient time has elapsed for penetration. Fill all nail holes with putty tinted to match the finish.

(b) After twelve hours, a thin coat of *Pitcairn Spirit Lacquer* or pure gum shellac shall be applied.

(c) This is followed by a coat of *White Zinc Filler* properly reduced with *Leptyne*, turpentine, or benzine, and brushed well into the grain. (The excess of Filler must be carefully and neatly cleaned from the surface by rubbing across the grain.)

(d) Care must be taken that all grooves and corners are well cleaned with a hardwood stick. All nail holes to be filled with putty tinted to match the finish.

(e) Apply one coat of *Pitcairn Aged Flat Finish*, flowed on with a badger-hair or black fitch flowing brush to insure a smooth dull finish.

Specification No. 53:

WAX FINISH—FOUR-COAT WORK STANDING TRIM

(a) All Oak Wood (locations designated) shall receive a coat of *Pitcairn No. 1 Flemish Stain*, or *Pitcairn No. 2 Weathered Stain*, the excess being removed with a cloth after sufficient time has elapsed for penetration. Fill all nail holes with putty tinted to match the finish.

(b) After twelve hours, a thin coat of *Pitcairn Spirit Lacquer* or pure gum shellac shall be applied. Tint the Lacquer or shellac with a little dry lamp-black, being careful to avoid a streaky finish.

(c) Apply one coat of *Pitcairn Aged Flat Finish*, flowed on with a badger-hair or black fitch flowing brush to insure a smooth dull finish. Allow at least twenty-four hours between coats for drying.

(d) Apply only enough Lacquer or shellac to seal the Stain. Avoid a heavy coating.

(e) Apply *Patton's Seventeenth Century Wax* and polish by hand-rubbing.

(f) If an extra-fine job is desired, allow a few hours for the first coat to dry; apply a second coat of *Wax*, and again polish.

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ALL SOFT WOODS—WEATHERED OAK EFFECT

Specification No. 54:

VARNISH FINISH—FOUR-COAT WORK STANDING TRIM

(a) All Soft Wood (locations designated) shall receive a coat of *Pitcairn No. 2 Weathered Stain*, the excess being removed with a cloth after sufficient time has elapsed for penetration. Fill all nail holes with putty tinted to match the finish.

(b) After twelve hours, a thin coat of *Pitcairn Spirit Lacquer* or pure gum shellac shall be applied.

(c) Apply two coats of *Pitcairn Aged Finishing Spar Varnish*, allowing at least forty-eight hours between coats for drying. Sand lightly between Varnish coats with No. 0 paper.

(d) If an extra-fine job is desired, apply a third coat of *Pitcairn Aged Finishing Spar Varnish*.

(e) If desired, the last coat may be rubbed to a dull finish with fine pumice stone and rubbing oil.

(f) If a dull finish is desired without the expense of rubbing, substitute *Pitcairn Aged Flat Finish* for the last Varnish coat.

(g) Apply Flat Varnish freely with a badger-hair or black fitch flowing brush.

(h) Apply only enough Spirit Varnish to seal the Stain. Avoid a heavy coating.

OAK AND ASH WOODS GREENISH WEATHERED OAK EFFECT

Specification No. 55:

VARNISH FINISH—FIVE-COAT WORK STANDING TRIM

(a) All Oak or Ash Wood (locations designated) shall receive a coat of *Pitcairn No. 4 Greenish Weathered Stain*, the excess being removed with a cloth after lapse of sufficient time for penetration.

(b) After twelve hours, a thin coat of *Pitcairn Spirit Lacquer* or pure gum shellac shall be applied.

(c) This is followed by a coat of *Patton's Natural Paste Wood Filler*, tinted with Stain to match the finish, properly reduced with *Leptyne*, turpentine, or benzine, and brushed well into the grain. (The excess of Filler must be carefully and neatly cleaned from the surface by rubbing across the grain.)

(d) Care must be taken that all grooves and corners are well cleaned with a hardwood stick. Fill all nail holes with putty tinted to match the finish.

(e) Apply one coat of *Pitcairn Green Glaze* and then one coat of *Pitcairn Aged Finishing Spar Varnish*, allowing at least forty-eight hours between coats for drying. Sand lightly between Varnish coats with No. 0 paper.

(f) If an extra-fine job is desired, apply a second coat of *Pitcairn Aged Finishing Spar Varnish*.

(g) If desired, the last coat may be rubbed to a dull finish with fine pumice stone and rubbing oil.

(h) If a dull finish is desired without the expense of rubbing, substitute *Pitcairn Aged Flat Finish* for the last Varnish coat.

(i) Apply Flat Varnish freely with a badger-hair or black fitch flowing brush.

(j) Apply only enough Spirit Lacquer to seal the Stain. Avoid a heavy coating.

CYPRESS, PINE, FIR, ASH, OR OAK WOOD GREENISH WEATHERED OAK EFFECT

Specification No. 56:

VARNISH FINISH—FOUR-COAT WORK STANDING TRIM

(a) All Cypress, Pine, Fir, Ash, or Oak Wood (locations designated) shall receive a coat of *Pitcairn No. 4 Greenish Weathered Stain*, the excess being removed with a cloth after sufficient time has elapsed for penetration. Fill all nail holes with putty tinted to match the finish.

(b) After twelve hours, a thin coat of *Pitcairn Spirit Lacquer* or pure gum shellac shall be applied.

(c) Then apply a coat of *Pitcairn Green Glaze* and one coat of *Pitcairn Aged Finishing Spar Varnish*, allowing at least forty-eight hours between coats for drying. Sand lightly between Varnish coats with No. 0 paper.

(d) If an extra-fine job is desired apply a second coat of *Pitcairn Aged Finishing Spar Varnish*.

(e) If desired, the last coat may be rubbed to a dull finish with fine pumice stone and rubbing oil.

(f) If a dull finish is desired without the expense of rubbing, substitute *Pitcairn Aged Flat Finish* for the last Varnish coat.

(g) Apply Flat Varnish freely with a badger-hair or black fitch flowing brush.

Specification No. 57:

MISSION FINISH—FOUR-COAT WORK STANDING TRIM

(a) All Cypress, Pine, Fir, Ash, or Oak Wood (locations designated) shall receive a coat of *Pitcairn No. 4 Greenish Weathered Stain*, the excess being removed with a cloth after sufficient time has elapsed for penetration. Fill all nail holes with putty tinted to match the finish.

(b) After twelve hours, a thin coat of *Pitcairn Spirit Lacquer* or pure gum shellac shall be applied.

(c) Apply one coat of *Pitcairn Green Glaze* and one coat of *Pitcairn Aged Flat Finish*, flowed on with a badger-hair or black fitch flowing brush to insure a smooth dull finish. Allow at least forty-eight hours between coats for drying.

Specification No. 58:

WAX FINISH—THREE-COAT WORK STANDING TRIM

(a) All Cypress, Pine, Fir, Ash, or Oak Wood (locations designated) shall receive a coat of *Pitcairn No. 4 Greenish Weathered Stain*, the excess

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being removed with a cloth after sufficient time has elapsed for penetration. Fill all nail holes with putty tinted to match the finish.

(b) After twelve hours, a thin coat of *Pitcairn Spirit Lacquer* or pure gum shellac shall be applied.

(c) Then apply *Patton's Seventeenth Century Wax* and polish by hand-rubbing.

(d) If an extra-fine job is desired, allow a few hours for the first coat to dry. Apply a second coat of *Wax* and again polish.

OAK, ASH, CYPRESS, PINE, FIR, OR REDWOOD GOLDEN OAK EFFECT

Specification No. 59:

VARNISH FINISH—FIVE-COAT WORK STANDING TRIM

(a) All Oak, Ash, Cypress, Pine, Fir, or Redwood (locations designated) shall receive a coat of *Pitcairn No. 6 Golden Oak Stain*, the excess being removed with a cloth after sufficient time has elapsed for penetration.

(b) After twelve hours, a thin coat of *Pitcairn Spirit Lacquer* or pure gum shellac shall be applied.

(c) This is followed by a coat of *Patton's Natural Paste Wood Filler*, tinted with Stain to match the finish, properly reduced with *Leptyne*, turpentine, or benzine, and brushed well into the grain. (The excess of Filler must be carefully and neatly cleaned from the surface by rubbing across the grain.)

(d) Care must be taken that all grooves and corners are well cleaned with a hardwood stick. Fill all nail holes with putty tinted to match the finish.

(e) Apply two coats of *Pitcairn Aged Finishing Spar Varnish*, allowing at least forty-eight hours between coats for drying. Sand lightly between Varnish coats with No. 0 paper.

(f) If an extra-fine job is desired, apply a third coat of *Pitcairn Aged Finishing Spar Varnish*.

(g) If desired, the last coat may be rubbed to a dull finish with fine pumice stone and rubbing oil.

(h) If a dull finish is desired without the expense of rubbing, substitute *Pitcairn Aged Flat Finish* for the last Varnish coat.

(i) Apply Flat Varnish freely with a badger-hair or black fitch flowing brush.

(j) For a deep, rich, coffee-brown effect, in place of first Varnish coat, apply one coat of *Pitcairn Walnut Waterspar Colored Varnish*.

Specification No. 60:

MISSION FINISH—FOUR-COAT WORK STANDING TRIM

(a) All Oak, Ash, Cypress, Pine, Fir, or Redwood (locations designated) shall receive a coat of *Pitcairn No. 6 Golden Oak Stain*, the excess being removed with a cloth after sufficient time has elapsed for penetration.

(b) After twelve hours, a thin coat of *Pitcairn Spirit Lacquer* or pure gum shellac shall be applied.

(c) Then apply two coats of *Pitcairn Aged Flat Finish*, flowed on with a badger-hair or black fitch flowing brush to insure a smooth dull finish. Allow at least twenty-four hours between coats for drying.

Specification No. 61:

WAX FINISH—THREE-COAT WORK STANDING TRIM

(a) All Oak, Ash, Cypress, Pine, Fir, or Redwood (locations designated) shall receive a coat of *Pitcairn No. 6 Golden Oak Stain*, the excess being removed with a cloth after sufficient time has elapsed for penetration.

(b) After twelve hours, a thin coat of *Pitcairn Spirit Lacquer*, or pure gum shellac shall be applied.

(c) Then apply *Patton's Seventeenth Century Wax*, and polish by hand-rubbing.

(d) If an extra-fine job is desired, allow a few hours for the first coat to dry. Apply a second coat of *Wax* and again polish.

Specification No. 62:

VARNISH FINISH—FOUR-COAT WORK STANDING TRIM

(a) All Oak, Ash, Cypress, Pine, Fir, or Redwood (locations designated) shall receive a coat of *Pitcairn No. 6 Golden Oak Stain*, the excess being removed with a cloth after sufficient time has elapsed for penetration.

(b) After twelve hours, a thin coat of *Pitcairn Spirit Lacquer* or pure gum shellac shall be applied.

(c) Apply two coats of *Pitcairn Aged Finishing Spar Varnish*, allowing at least forty-eight hours between coats for drying. Sand lightly between Varnish coats with No. 0 paper.

(d) If an extra-fine job is desired, apply a third coat of *Pitcairn Aged Finishing Spar Varnish*.

(e) If desired, the last coat may be rubbed to a dull finish with fine pumice stone and rubbing oil.

(f) If a dull finish is desired without the expense of rubbing, substitute *Pitcairn Aged Flat Finish* for the last Varnish coat.

(g) Apply Flat Varnish freely with a badger-hair or black fitch flowing brush.

PINE, CYPRESS, BIRCH, OAK, OR ASH WOOD SILVER GRAY EFFECT

Specification No. 63:

VARNISH FINISH—FIVE-COAT WORK STANDING TRIM

(a) All Pine, Cypress, Birch, Oak, or Ash Wood (locations designated) shall first be sponged with water to raise the grain. Then dry thoroughly. Sandpaper to a smooth surface and apply a thin coat of *Pitcairn Silver Gray Acid Stain*. After this has dried well, apply a coat of *White Zinc Filler*, properly reduced with *Leptyne*, turpentine, or benzine, and brushed well into the grain. (Do not add oil when thinning the Filler.) The excess of Filler

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must be carefully and neatly cleaned from the surface by rubbing across the grain.

(b) Care must be taken that all grooves and corners are well cleaned with a hardwood stick. Fill all nail holes with putty tinted to match the finish.

(c) After twelve hours, apply a thin coat of *Pitcairn Spirit Lacquer* or pure gum shellac.

(d) Apply two coats of *Pitcairn Aged Finishing Spar Varnish*, allowing at least forty-eight hours between coats for drying. Sand lightly between Varnish coats with No. 0 paper.

(e) If an extra-fine job is desired, apply a third coat of *Pitcairn Aged Finishing Spar Varnish*.

(f) If desired, the last coats may be rubbed to a dull finish with fine pumice stone and rubbing oil.

(g) If a dull finish is desired, without the expense of rubbing, substitute *Pitcairn Aged Flat Finish* for the last Varnish coat.

(h) Apply Flat Varnish freely with a badger-hair or black fitch flowing brush.

(i) Apply only enough Spirit Lacquer to seal the Stain. Avoid a heavy coating.

Specification No. 64:

MISSION FINISH—FOUR-COAT WORK STANDING TRIM

(a) All Pine, Cypress, Birch, Oak, or Ash Wood (locations designated) shall first be sponged with water to raise the grain. Then dry thoroughly. Sandpaper to a smooth surface and apply a thin coat of *Pitcairn Silver Gray Acid Stain*. After this has dried well, apply a coat of *White Zinc Filler*, properly reduced with *Leptyne*, turpentine, or benzine, and brushed well into the grain. (Do not add oil when thinning the Filler.) The excess of Filler must be carefully and neatly cleaned from the surface by rubbing across the grain.

(b) Care must be taken that all grooves and corners are well cleaned with a hardwood stick. Fill all nail holes with putty tinted to match the finish.

(c) After twelve hours, apply a thin coat of *Pitcairn Spirit Lacquer* or pure gum shellac.

(d) Apply a coat of *Pitcairn Aged Flat Finish*, flowed on with a badger-hair or black fitch flowing brush to insure a smooth dull finish.

Specification No. 65:

WAX FINISH—FOUR-COAT TRIM STANDING TRIM

(a) All Pine, Cypress, Birch, Oak, or Ash Wood (locations designated) shall first be sponged with water to raise the grain. Then dry thoroughly. Sandpaper to a smooth surface and apply a thin coat of *Pitcairn Silver Gray Acid Stain*. After this has dried well, apply a coat of *White Zinc Filler*, properly reduced with *Leptyne*, turpentine, or benzine, and brushed well into the grain. (Do not add oil when thinning the Filler.) The excess of Filler must be carefully and neatly cleaned from the surface by rubbing across the grain.

(b) Care must be taken that all grooves and corners are well cleaned with a hardwood stick. Fill all nail holes with putty tinted to match the finish.

(c) After twelve hours, apply a thin coat of *Pitcairn Spirit Lacquer* or pure gum shellac.

(d) Apply *Patton's Seventeenth Century Wax* and polish by hand-rubbing.

(e) If an extra-fine job is desired, allow a few hours for the first coat to dry. Apply a second coat of *Wax* and again polish.

MAHOGANY WOOD DARK OR EXTRA DARK MAHOGANY EFFECT

Specification No. 66:

VARNISH FINISH—FIVE-COAT WORK STANDING TRIM

(a) All Mahogany Wood (locations designated) shall receive a coat of *Pitcairn No. 10 Mahogany Stain*, or *Pitcairn No. 15 Extra Dark Mahogany Stain*, the excess being removed with a cloth after sufficient time has elapsed for penetration.

(b) After twelve hours, a thin coat of *Pitcairn Spirit Lacquer* or pure gum shellac shall be applied.

(c) This is followed by a coat of *Patton's Natural Paste Wood Filler*, tinted with Stain to match finish, properly reduced with *Leptyne*, turpentine, or benzine, and brushed well into the grain. (The excess of Filler must be carefully and neatly cleaned from the surface by rubbing across the grain.)

(d) Care must be taken that all grooves and corners are well cleaned with a hardwood stick. Fill all nail holes with putty tinted to match the finish.

(e) Apply one coat of *Pitcairn Mahogany Glaze Varnish*; allow at least forty-eight hours' drying; follow with one coat *Pitcairn Aged Finishing Spar Varnish*. Sand lightly between Varnish coats with No. 0 paper.

(f) If an extra-fine job is desired, apply a third coat of *Pitcairn Aged Finishing Spar Varnish*.

(g) If desired, the last coat may be rubbed to a dull finish with fine pumice stone and rubbing oil.

(h) If a dull finish is desired without the expense of rubbing, substitute *Pitcairn Aged Flat Finish* for the last Varnish coat.

(i) Apply Flat Varnish freely with a badger-hair or black fitch flowing brush.

(j) Apply only enough Spirit Lacquer to seal the Stain. Avoid a heavy coating.

BIRCH WOOD DARK OR EXTRA DARK MAHOGANY EFFECT

Specification No. 67:

VARNISH FINISH—FOUR-COAT WORK STANDING TRIM

(a) All Birch Wood (locations designated) shall receive a coat of *Pitcairn No. 10 Mahogany Stain*, or *Pitcairn Stain No. 15*, the excess being removed with a cloth after sufficient time has elapsed for

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penetration. Fill all nail holes with putty tinted to match the finish.

(b) After twelve hours, a thin coat of *Pitcairn Spirit Lacquer* or pure gum shellac shall be applied.

(c) Apply one coat of *Pitcairn Mahogany Glaze Varnish*; allow at least forty-eight hours' drying, and apply one coat of *Pitcairn Aged Finishing Spar Varnish*. Sand lightly between Varnish coats with No. 0 paper.

(d) If an extra-fine job is desired, apply a third coat of *Pitcairn Aged Finishing Spar Varnish*.

(e) If desired, the last coat may be rubbed to a dull finish with fine pumice stone and rubbing oil.

(f) If a dull finish is desired without the expense of rubbing, substitute *Pitcairn Aged Flat Finish* for the last Varnish coat.

(g) Apply Flat Varnish freely with badger-hair or black fitch flowing brush.

Specification No. 68:

MISSION FINISH—FOUR-COAT WORK STANDING TRIM

(a) All Birch Wood (locations designated) shall receive a coat of *Pitcairn No. 10 Mahogany Stain*, or *Pitcairn Stain No. 15*, the excess being removed with a cloth after sufficient time has elapsed for penetration. Fill all nail holes with putty tinted to match the finish.

(b) After twelve hours, a thin coat of *Pitcairn Spirit Lacquer* or pure gum shellac shall be applied.

(c) Apply two coats of *Pitcairn Aged Flat Finish*, flowed on with a badger-hair or black fitch flowing brush to insure a smooth dull finish. Allow at least twenty-four hours between coats for drying.

Specification No. 69:

WAX FINISH—THREE-COAT WORK STANDING TRIM

(a) All Birch Wood (locations designated) shall receive a coat of *Pitcairn No. 10 Mahogany Stain*, or *Pitcairn Stain No. 15*, the excess being removed with a cloth after sufficient time has elapsed for penetration. Fill all nail holes with putty tinted to match the finish.

(b) After twelve hours, a thin coat of *Pitcairn Spirit Lacquer* or pure gum shellac shall be applied.

(c) Apply *Patton's Seventeenth Century Wax* and polish by hand-rubbing.

(d) If an extra-fine job is desired, allow a few hours for the first coat to dry; apply a second coat of *Wax*, and again polish.

OAK WOOD—FUMED EFFECT

Specification No. 70:

VARNISH FINISH—FIVE-COAT WORK STANDING TRIM

(a) All Oak Wood (locations designated) shall receive a coat of *Pitcairn No. 11 Fumed Oak Stain*,

the excess being removed with a cloth after sufficient time has elapsed for penetration.

(b) After twelve hours, a thin coat of *Pitcairn Spirit Lacquer* or pure gum shellac shall be applied.

(c) This is followed by a coat of *Patton's Natural Paste Wood Filler*, tinted with Stain to match the finish, properly reduced with *Leptyne*, turpentine, or benzine, and brushed well into the grain. (The excess of Filler must be carefully and neatly cleaned from the surface by rubbing across the grain.)

(d) Care must be taken that all grooves and corners are well cleaned with a hardwood stick. Fill all nail holes with putty tinted to match the finish.

(e) Apply two coats of *Pitcairn Aged Finishing Spar Varnish*, allowing at least forty-eight hours between coats for drying. Sand lightly between Varnish coats with No. 0 paper.

(f) If an extra-fine job is desired, apply a third coat of *Pitcairn Aged Finishing Spar Varnish*.

(g) If desired, the last coat may be rubbed to a dull finish with fine pumice stone and rubbing oil.

(h) If a dull finish is desired without the expense of rubbing, substitute *Pitcairn Aged Flat Finish* for the last Varnish coat.

(i) Apply Flat Varnish freely with a badger-hair or black fitch flowing brush.

(j) Apply only enough *Spirit Lacquer* to seal the Stain. Avoid a heavy coating.

Specification No. 71:

MISSION FINISH—FOUR-COAT WORK STANDING TRIM

(a) All Oak Wood (locations designated) shall receive a coat of *Pitcairn No. 11 Fumed Oak Stain*, the excess being removed with a cloth after sufficient time has elapsed for penetration.

(b) After twelve hours, a thin coat of *Pitcairn Spirit Lacquer* or pure gum shellac shall be applied.

(c) Apply two coats of *Pitcairn Aged Flat Finish*, flowed on with a badger-hair or black fitch flowing brush to insure a smooth dull finish.

Specification No. 72:

WAX FINISH—THREE-COAT WORK STANDING TRIM

(a) All Oak Wood (locations designated) shall receive a coat of *Pitcairn No. 11 Fumed Oak Stain*, the excess being removed with a cloth after sufficient time has elapsed for penetration.

(b) After twelve hours, a thin coat of *Pitcairn Spirit Lacquer* or pure gum shellac shall be applied.

(c) Apply *Patton's Seventeenth Century Wax* and polish by hand-rubbing.

(d) If an extra-fine job is desired, allow a few hours for the first coat to dry; apply a second coat of *Wax*, and again polish.

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OAK AND ASH WOODS EARLY ENGLISH EFFECT

Specification No. 73:

VARNISH FINISH—FIVE-COAT WORK STANDING TRIM

(a) All Oak and Ash Woods (locations designated) shall receive a coat of *Pitcairn No. 12 Early English Stain*, the excess being removed with a cloth after sufficient time has elapsed for penetration.

(b) After twelve hours, a thin coat of *Pitcairn Spirit Lacquer* or pure gum shellac shall be applied.

(c) This is to be followed by a coat of *Patton's Natural Paste Wood Filler*, tinted with Stain to match finish, properly reduced with *Leptyne*, turpentine, or benzine, and brushed well into the grain.

(d) Care must be taken that all grooves and corners are well cleaned with a hardwood stick. Fill all nail holes with putty tinted to match the finish.

(e) Apply two coats of *Pitcairn Aged Finishing Spar Varnish*, allowing at least forty-eight hours between coats for drying. Sand lightly between Varnish coats with No. 0 paper.

(f) If an extra-fine job is desired, apply a third coat of *Pitcairn Aged Finishing Spar Varnish*.

(g) If desired, the last coat may be rubbed to a dull finish with fine pumice stone and rubbing oil.

(h) If a dull finish is desired without the expense of rubbing, substitute *Pitcairn Aged Flat Finish* for the last Varnish coat.

(i) Apply Flat Varnish freely with a badger-hair or black fitch flowing brush.

(j) Apply only enough Spirit Lacquer to seal the Stain. Avoid a heavy coating.

(k) For a deep, rich, coffee-brown effect, in place of the first Varnish coat apply one coat of *Pitcairn Walnut Waterspar Colored Varnish*.

BIRCH, PINE, CYPRESS, REDWOOD, AND FIR WOOD EARLY ENGLISH EFFECT

Specification No. 74:

VARNISH FINISH—FOUR-COAT WORK STANDING TRIM

(a) All Birch, Pine, Cypress, Redwood, and Fir Wood (locations designated) shall receive a coat of *Pitcairn No. 12 Early English Stain*, the excess being removed with a cloth after sufficient time has elapsed for penetration. Fill all nail holes with putty tinted to match the finish.

(b) After twelve hours, a thin coat of *Pitcairn Spirit Lacquer* or pure gum shellac shall be applied.

(c) Apply two coats of *Pitcairn Aged Finishing Spar Varnish*, allowing at least forty-eight hours between coats for drying. Sand lightly between Varnish coats with No. 0 paper.

(d) If an extra-fine job is desired, apply a third coat of *Pitcairn Aged Finishing Spar Varnish*.

(e) If desired, the last coat may be rubbed to a dull finish with fine pumice stone and rubbing oil.

(f) If a dull finish is desired without the expense of rubbing, substitute *Pitcairn Aged Flat Finish* for the last Varnish coat.

(g) Apply Flat Varnish freely with a badger-hair or black fitch flowing brush.

(h) Apply only enough Spirit Lacquer to seal the Stain. Avoid a heavy coating.

Specification No. 75:

MISSION FINISH—FOUR-COAT WORK STANDING TRIM

(a) All Birch, Pine, Cypress, Redwood, and Fir Wood (locations designated) shall receive a coat of *Pitcairn No. 12 Early English Stain*, the excess being removed with a cloth after sufficient time has elapsed for penetration. Fill all nail holes with putty tinted to match the finish.

(b) After twelve hours, a thin coat of *Pitcairn Spirit Lacquer* or pure gum shellac shall be applied.

(c) Apply two coats of *Pitcairn Aged Flat Finish* flowed on with a badger-hair or black fitch flowing brush to insure a smooth dull finish. Allow at least twenty-four hours between coats for drying.

(d) Apply only enough Spirit Lacquer to seal the Stain. Avoid a heavy coating.

See Specification No. 73 (j) and (k).

Specification No. 76:

WAX FINISH—THREE-COAT WORK STANDING TRIM

(a) All Birch, Pine, Cypress, Redwood, and Fir Wood (locations designated) shall receive a coat of *Pitcairn No. 12 Early English Stain*, the excess being removed with a cloth after sufficient time has elapsed for penetration. Fill all nail holes with putty tinted to match the finish.

(b) After twelve hours, a thin coat of *Pitcairn Spirit Lacquer* or pure gum shellac shall be applied.

(c) Apply *Patton's Seventeenth Century Wax* and polish by hand-rubbing.

(d) If an extra-fine job is desired, allow a few hours for the first coat to dry; apply a second coat of *Wax*, and again polish.

See Specification No. 73 (j) and (k).

GUM, PINE, AND FIR WOODS CIRCASSIAN WALNUT EFFECT

Specification No. 77:

VARNISH FINISH—FOUR-COAT WORK STANDING TRIM

(a) All Gum, Pine, and Fir Woods (locations designated) shall receive a coat of *Pitcairn No. 13 Circassian Walnut Stain*, the excess being removed with a cloth after sufficient time has elapsed for penetration. Fill all nail holes with putty tinted to match the filler.

(b) After twelve hours, a thin coat of *Pitcairn Spirit Lacquer* or pure gum shellac shall be applied.

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(c) Apply two coats of *Pitcairn Aged Finishing Spar Varnish*, allowing at least forty-eight hours between coats for drying. Sand lightly between Varnish coats with No. 0 paper.

(d) If an extra-fine job is desired, apply a third coat of *Pitcairn Aged Finishing Spar Varnish*.

(e) If desired, the last coat may be rubbed to a dull finish with fine pumice stone and rubbing oil.

(f) If a dull finish is desired without the expense of rubbing, substitute *Pitcairn Aged Flat Finish* for the last Varnish coat.

(g) Apply Flat Varnish freely with a badger-hair or black fitch flowing brush.

(h) Apply only enough Spirit Lacquer to seal the Stain. Avoid a heavy coating.

Specification No. 78:

MISSION FINISH—FOUR-COAT WORK STANDING TRIM

(a) All Gum, Pine, and Fir Woods (locations designated) shall receive a coat of *Pitcairn No. 13 Circassian Walnut Stain*, the excess being removed with a cloth after sufficient time has elapsed for penetration. Fill all nail holes with putty tinted to match the filler.

(b) After twelve hours, a thin coat of *Pitcairn Spirit Lacquer* or pure gum shellac shall be applied.

(c) Apply two coats of *Pitcairn Aged Flat Finish*, flowed on with a badger-hair or black fitch flowing brush to insure a smooth dull finish. Allow at least twenty-four hours between coats for drying.

See *Specification No. 77 (h)*.

Specification No. 79:

WAX FINISH—THREE-COAT WORK STANDING TRIM

(a) All Gum, Pine, and Fir Woods (locations designated) shall receive a coat of *Pitcairn No. 13 Circassian Walnut Stain*, the excess being removed with a cloth after sufficient time has elapsed for penetration. Fill all nail holes with putty tinted to match the filler.

(b) After twelve hours, a thin coat of *Pitcairn Spirit Lacquer* or pure gum shellac shall be applied.

(c) Apply *Patton's Seventeenth Century Wax* and polish by hand-rubbing.

(d) If an extra-fine job is desired, allow a few hours for the first coat to dry; apply a second coat of *Wax*, and again polish.

See *Specification No. 77 (h)*.

FLOOR FINISHES OAK OR ASH WOOD

Specification No. 80:

VARNISH FINISH—FOUR-COAT WORK

(a) All Oak or Ash floors (locations designated) shall receive a coat of *Patton's Natural Paste Wood Filler*, properly reduced with *Leptyne*, turpentine, or benzine, brushed well into the grain. (The excess of Filler must be carefully and neatly cleaned from the surface by rubbing across the grain.)

(b) Care must be taken that all grooves and corners are well cleaned with a hardwood stick. Fill all nail holes with putty tinted to match the finish.

(c) The surface shall then receive a coat of *Pitcairn Tector*, reduced with *Leptyne* or turpentine, gallon for gallon. After twenty-four hours, sand carefully.

(d) Apply two coats of *Pitcairn Aged Floor Spar Varnish*, allowing at least forty-eight hours between coats for drying. Sand lightly between Varnish coats with No. 0 paper.

(e) If an extra-fine job is desired, apply a third coat of *Pitcairn Aged Floor Spar Varnish*.

(f) If desired, the last coat may be rubbed to a dull finish with fine pumice stone and rubbing oil.

Specification No. 81:

WAX FINISH—THREE-COAT WORK

(a) All Oak or Ash floors (locations designated) shall receive a coat of *Patton's Natural Paste Wood Filler*, properly reduced with *Leptyne*, turpentine, or benzine, brushed well into the grain. (The excess of Filler must be carefully and neatly cleaned from the surface by rubbing across the grain.)

(b) Care must be taken that all grooves and corners are well cleaned with a hardwood stick. Fill all nail holes with putty tinted to match the finish.

(c) The surface shall then receive a coat of *Pitcairn Tector*, reduced with *Leptyne* or turpentine, gallon for gallon. After twenty-four hours, sand carefully.

(d) Apply *Patton's Seventeenth Century Wax* and polish with a weighted brush.

(e) If an extra-fine job is desired, allow a few hours for the first coat to dry; apply a second coat of *Wax*, and again polish.

MAPLE, BIRCH, BEECH, PINE, AND FIR WOODS

Specification No. 82:

VARNISH FINISH—THREE-COAT WORK

(a) All Maple, Birch, Beech, Pine, and Fir Wood floors (locations designated) shall receive a coat of *Pitcairn Tector*, reduced, according to directions on the can, with *Leptyne*, turpentine, or benzine. After twenty-four hours, sandpaper carefully. Fill all nail holes with putty tinted to match the finish.

(b) Apply two coats of *Pitcairn Aged Floor Spar Varnish*, allowing at least forty-eight hours between coats for drying. Sand lightly between Varnish coats with No. 0 paper.

(c) If an extra-fine job is desired, apply a third coat of *Pitcairn Aged Floor Spar Varnish*.

(d) If desired, the last coat may be rubbed to a dull finish with fine pumice stone and rubbing oil.

Specification No. 83:

WAX FINISH—TWO-COAT WORK

(a) All Maple, Birch, Beech, Pine, and Fir Wood floors (locations designated) shall receive a coat of *Pitcairn Tector*, reduced, according to directions

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on the can, with *Leptyne*, turpentine, or benzine. After twenty-four hours, sandpaper carefully. Fill all nail holes with putty tinted to match the finish.

(b) Apply one coat of *Pitcairn Aged Floor Spar Varnish*, allowing at least forty-eight hours for drying.

WHITE ENAMEL FINISHES—BANZAI SYSTEM OAK AND ASH WOODS

Specification No. 84:

HIGH-GLOSS ENAMEL FINISH—FIVE-COAT WORK

(a) All Oak and Ash Woods (locations designated) shall receive a coat of *Patton's Natural Wood Paste Filler*, properly reduced with *Leptyne*, turpentine, or benzine, brushed well into the grain. (The excess of Filler must be carefully and neatly cleaned from the surface by rubbing across the grain.)

(b) Care must be taken that all grooves and corners are well cleaned with a hardwood stick. Fill all nail holes with putty.

(c) Then apply two coats of *Banzai Double-Cover Undercoater* as it comes in the can, allowing twenty-four hours between coats. Sand the last coat to a smooth surface.

(d) For the next coat, use a mixture of two part of *Banzai Enamel* and one part *Banzai Double Cover Undercoater*. Sand lightly after allowing forty-eight hours for this coat to dry.

(e) The last coat shall be flowed on freely—using *Banzai Enamel* as it comes in the can.

(f) If an extra-fine finish is desired, rub the enamel coat and flow on another coat of *Banzai Enamel*.

Specification No. 85:

EGG-SHELL ENAMEL FINISH—FOUR-COAT WORK

(a) All Oak and Ash Woods (locations designated) shall receive a coat of *Patton's Natural Wood Paste Filler*, properly reduced with *Leptyne*, turpentine, or benzine, brushed well into the grain. (The excess of Filler must be carefully and neatly cleaned from the surface by rubbing across the grain.)

(b) Care must be taken that all grooves and corners are well cleaned with a hardwood stick. Fill all nail holes with putty.

(c) Then apply two coats of *Banzai Double-Cover Undercoater* as it comes in the can, allowing twenty-four hours between coats. Sand the last coat to a smooth surface.

(d) The last coat shall be flowed on freely, using *Banzai Egg-Shell Enamel* as it comes in the can.

(e) If an extra-fine finish is desired, rub the Enamel coat and flow on another coat of *Banzai Egg-Shell Enamel*.

(f) In applying *Egg-Shell Enamel* avoid retouching places which have already set or flattened.

BIRCH, MAPLE, CYPRESS, GUM, WHITEWOOD, REDWOOD, AND POPLAR WOOD METAL AND PLASTER

Specification No. 86:

HIGH-GLOSS ENAMEL FINISH—FIVE-COAT WORK

(a) All Birch, Maple, Cypress, Gum, White-wood, Redwood, and Poplar Wood, and metal and plastered surfaces (locations designated) shall receive a coat of *Pitcairn Tector*, reduced according to directions on the can, with *Leptyne*, turpentine, or benzine. If desired, covering will be improved by use of a priming mixture of one gallon *Pitcairn Tector* reduced with one gallon *Banzai Double-Cover Undercoater* and one-half gallon boiled linseed oil. After twenty-four hours, sandpaper carefully. Fill all nail holes with putty.

(b) Then apply two coats of *Banzai Double-Cover Undercoater* as it comes in the can, allowing twenty-four hours between coats. Sand between coats to a smooth surface.

(c) For the next coat use a mixture of two parts of *Banzai Enamel* and one part *Banzai Double-Cover Undercoater*. Sand lightly after allowing forty-eight hours for this coat to dry.

(d) The last coat shall be flowed on freely, using *Banzai Enamel* as it comes in the can.

(e) If an extra-fine finish is desired, rub the last Enamel coat and flow on another coat of *Banzai Enamel*.

Specification No. 87:

EGG-SHELL ENAMEL FINISH—FOUR-COAT WORK

(a) All Birch, Maple, Cypress, Gum, White-wood, Redwood, and Poplar Wood, and metal and plastered surfaces (locations designated) shall receive a coat of *Pitcairn Tector*, reduced according to directions on the can, with *Leptyne*, turpentine, or benzine. After twenty-four hours, sandpaper carefully. Fill all nail holes with putty.

(b) Then apply two coats of *Banzai Double-Cover Undercoater* as it comes in the can, allowing twenty-four hours between coats. Sand the last coat to a smooth surface.

(c) The last coat shall be flowed on freely, using *Banzai Egg-Shell Enamel* as it comes in the can.

(d) If an extra-fine finish is desired, rub the last Enamel coat and flow on another coat of *Banzai Egg-Shell Enamel*.

(e) In applying *Egg-Shell Enamel* avoid retouching places which have already set or flattened.

(f) The success of the finish depends upon each coat being thoroughly dry before another coat is applied. As much time as possible should be given between coats.

A SERVICE FOR INDUSTRIAL PAINT USERS

THE Paint and Varnish Division of the Pittsburgh Plate Glass Company has a technical staff composed of men with years of both practical and laboratory experience, whose services are at the disposal of industrial concerns who have exceptional or troublesome problems to meet.

This organization is the outgrowth of a definite demand for a service of this nature, and this group of men are functioning daily at our plants at Milwaukee, Wisconsin, and Newark, New Jersey, being known as the Patton Paint and Varnish Advisory Board.

Manufacturers are constantly striving to improve the appearance of their products; others are in search of a finish that will last longer. Special finishes to resist oil, brine, gases, extreme temperature, or vibration, are among the problems this Board has been called upon to solve.

There is always the question of reduced finishing costs, or better results at an equal cost. The Patton Paint and Varnish Advisory Board has found it possible to make suggestions which in a number of instances have resulted in material economies.

Again, there are plants which are improperly painted, where corrosion is getting in its destructive work, where dark and dingy interiors are decreasing efficiency of men and machines, and greatly multiplying the chances for accidents. A chart of standardized practices for plant maintenance, as to material and color to be used for the various needs encountered, would eliminate all guesswork and would result in much saving to almost any concern whatsoever.

The Patton Paint and Varnish Advisory Board is ready to co-operate and to assist any manufacturer in the development of new paint products

exactly suited to his problem, new methods of application as a means toward economy or improved finishes, or the preparation of charts and specifications for scientific plant maintenance. Perhaps your paint department is having difficulties which our Advisory Board, thanks to years of varied experience, can quickly remedy.

In many cases a single wrong paint product is spoiling an otherwise good finish. Sometimes the filler is causing the trouble, or it may be the priming or finishing coat. The changing of one or two ingredients in one of these paint products may make a world of difference in the quality of the final finish.

Are your finishing costs too high? Perhaps satisfactory results can be obtained with fewer coats. Or, possibly, by changing your methods of application economy can be secured.

Let our Advisory Board co-operate with your paint department. If you are now following the best practices, they will tell you so; if not, suggestions for improvement will be made.

Since the founding of the Patton Paint and Varnish Advisory Board hundreds of manufacturers have requested and received help—help for which no charge has been made or accepted. So, by availing yourself of this service you are placed under no obligation whatsoever. Any increased business that may develop must come to us on the merits of the changes suggested.

Let one of our representatives confer with you concerning any paint difficulties you may be having. Or, if the case requires it, a member of the Advisory Board will call in person. Then a thorough study of your problem will be made and a written report will be submitted to you giving in detail the recommendations of our Advisory Board.

COLOR SUGGESTIONS

IN THE following pages are illustrated a number of exteriors and interiors showing effects produced by the use of Proof Paint and Varnish Products. These selections cover a wide range of subjects. The color specifications given below each picture are not intended as infallible guides. In choosing a combination of colors, many things must be taken into account.

On exteriors, the surroundings enter largely into the problem; and in interiors the furnishings play a very important part in deciding on the wall color that will display them to the best advantage; in commercial interiors practical considerations are uppermost, but individual preference weighs heavily in the final decision.

The subjects following, therefore, are given as examples of what can be produced by the use of Proof Paint and Varnish Products. Of course, it goes without saying that where the illustration aptly meets some particular need, it may be utilized unchanged, as a guide for producing like results.



Pitcairn Banzai Enamel is used in finishing this white enamel entrance.

COLOR SUGGESTIONS



Color Suggestions for Subject Above

BODY—No. 308 Deep Buff Sun-Proof Paint.

TRIM—Outside White Sun-Proof Paint.

ROOF—No. 343 Indian Red Tor-on Shingle Stain.

PORCHES—Outside White Sun-Proof Paint.

PORCH FLOORS—Old Gold Porchite.

FRONT DOOR—Pitcairn Banzai White Enamel.



COLOR SUGGESTIONS



Color Suggestions for Subject on Opposite Page

BODY—Patton's Buff Cementhide Paint.
 TRIM—Patton's Buff Cementhide Paint.
 ROOF—Composition Shingles—Terra Cotta color.
 WINDOW SASH AND WOOD TRIM—Outside White Sun-Proof Paint.
 PORCH FLOOR—Terra Cotta color. Tile floors.
 FRONT DOOR—Stained with Pitcairn Dark Mahogany Stain No. 10, varnished.

Color Suggestions for Subject Above

BODY—No. 302 French Gray Sun-Proof Paint.
 TRIM—Outside White Sun-Proof Paint.
 ROOF—No. 342 Ivy Green Tor-on Shingle Stain.
 BLINDS—No. 336 Willow Green Sun-Proof Paint.
 PORCH—No. 302 French Gray Sun-Proof Paint.
 PORCH FLOOR—Maltese Blue Porchite.
 FRONT DOOR—Stained with Pitcairn Stain No. 6, Golden Oak, and varnished.



Color Suggestions for Subject Above

No. 1

BODY—No. 340 Copper Brown Sun-Proof Paint.

TRIM—No. 55 Milwaukee Brick Sun-Proof Paint.

ROOF—No. 354 Moss Green Tor-on Shingle Stain.

PORCH FLOOR—Leaf Brown Porchite.

FRONT DOOR—Stained with Pitcairn Stain No. 6, Golden Oak, and varnished.

No. 2

BODY—Upper: No. 304 Neutral Drab Sun-Proof Paint.

Lower: No. 320 Amber Brown Sun-Proof Paint.

TRIM—Outside White Sun-Proof Paint.

ROOF—No. 342 Ivy Green Tor-on Shingle Stain.

PORCH FLOOR—Maltese Blue Porchite Paint.

FRONT DOOR—Stained with Pitcairn Stain No. 6, Golden Oak, and varnished.

No. 3

BODY—Upper: No. 320 Amber Brown Sun-Proof Paint.

Lower: No. 55 Milwaukee Brick Sun-Proof Paint.

TRIM—No. J Indian Tan Sun-Proof Paint.

ROOF—No. 362 Russet Tor-on Shingle Stain.

FRONT DOOR—Stained with Pitcairn Stain No. 6, Golden Oak, and varnished.

COLOR SUGGESTIONS



Color Suggestions for Subject Above

No. 1

BODY—No. J Indian Tan Sun-Proof Paint.

TRIM—No. 314 Rich Buff Sun-Proof Paint.

ROOF—No. 362 Russet Tor-on Shingle Stain.

BLINDS—No. 341 Copper Verde Sun-Proof Paint.

PORCH FLOOR—Leaf Brown Porchite Paint.

FRONT DOOR—Stained with Pitcairn Stain No. 6, Golden Oak, and varnished.

No. 2

BODY—No. 12X Light Olive Sun-Proof Paint.

TRIM—Outside White Sun-Proof Paint.

ROOF—No. 354 Moss Green Tor-on Shingle Stain.

BLINDS—No. 336 Willow Green Sun-Proof Paint.

FRONT DOOR—Pitcairn Banzai White Enamel.

No. 3

BODY—No. 173 Straw Sun-Proof Paint.

TRIM—Outside White Sun-Proof Paint.

ROOF—No. 343 Indian Red Tor-on Shingle Stain.

BLINDS—No. 338 Kentucky Blind Green Sun-Proof Paint.

PORCH FLOOR—Leaf Brown Porchite.

FRONT DOOR—Stained with Pitcairn Stain No. 6, Golden Oak, and varnished.

PITTSBURGH PLATE GLASS COMPANY



COLOR SUGGESTIONS



Color Suggestions for Subject on Opposite Page

CEILING—Rich Cream Velumina.
 WALLS—Medium Buff Velumina.
 WOODWORK—Banzai Enamel tinted to a
 very light gray.
 STAIR RAIL—Stained with Pitcairn Dark
 Mahogany Stain No. 10, varnished.
 FLOORS—Stained with Pitcairn Early Eng-
 lish Stain No. 12 and varnished.

Color Suggestions for Subject Above

CEILING—Ivory Velumina.
 WALLS—Velumina intermixed according to
 the following formula:
 Two parts Ivory Velumina,
 One part Silver Green Velumina,
 One part Pearl Gray Velumina.
 WOODWORK—Banzai Enamel tinted ivory.
 FLOORS—Natural and varnished.



COLOR SUGGESTIONS



Color Suggestions for Subject on Opposite Page

CEILING AND WALLS—Banzai Enamel tinted to a very faint gray.

WOODWORK—Same as walls, except side boards, which are to remain natural and to be varnished.

FLOORS—Covered with linoleum, varnished.

RADIATORS—Velumina intermixed according to the following formula:

Two parts Medium Buff Velumina,
One part French Gray Velumina,
One part Nile Green Velumina.

Color Suggestions for Subject Above

CEILING—Patton's Velumina intermixed according to the following formula:

Two parts Light Buff Velumina,
One part Medium Buff Velumina,
One part French Gray Velumina.

WALLS—Same as ceiling.

MOULDING AND WOODWORK—Banzai Egg-Shell Enamel tinted to same shade as the walls.

DOORS—Stained with Pitcairn Mahogany Stain No. 10, varnished and rubbed dull.

FLOORS—Natural and varnished.

PITTSBURGH PLATE GLASS COMPANY



COLOR SUGGESTIONS



Color Suggestions for Subject on Opposite Page

CEILING—Patton's White Velumina tinted
with Azure Velumina.

WALLS—Same as ceiling.

WOODWORK—Banzai Enamel tinted a deep
ivory shade.

FLOORS—Covered with linoleum and var-
nished.

Color Suggestions for Subject Above

CEILING—Patton's Rich Cream Velumina.

WALLS—Patton's Velumina intermixed ac-
cording to the following directions:

Three parts French Gray Velumina,
One part Silver Green Velumina.

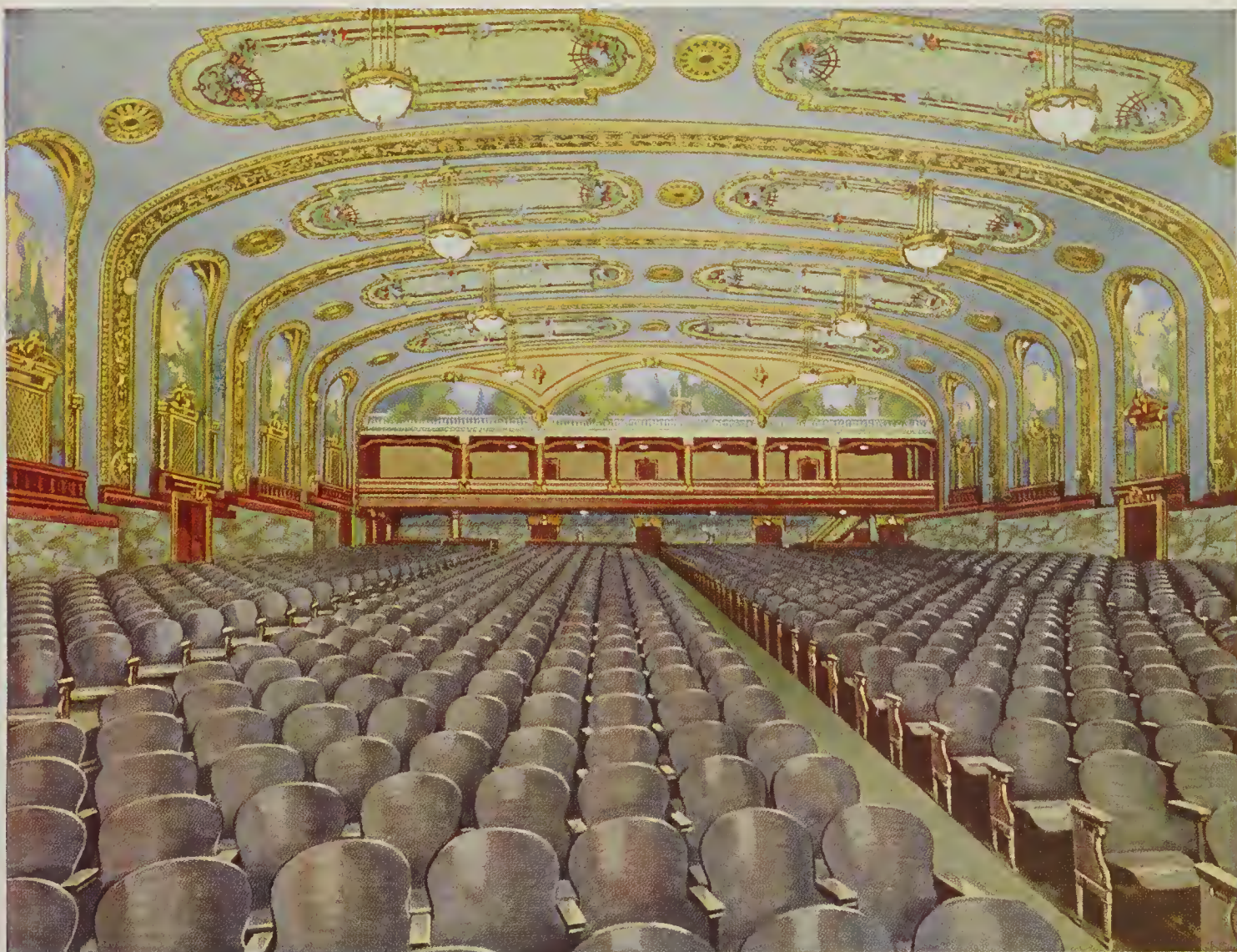
Stencil design as shown.

WOODWORK—Banzai Enamel.

FLOORS—Natural and varnished.



COLOR SUGGESTIONS



Color Suggestions for Subject on Opposite Page

WALLS AND CEILING—Velumina tinted with Patton's Oil Colors to the desired shade.

BEAMS—White Velumina tinted to a light brown by addition of the Wall Color.

SEATS—Stained with Pitcairn Early English Stain No. 12 and varnished.

FLOOR—Natural and varnished.

Color Suggestions for Subject Above

WALLS AND CEILING—Patton's Velumina intermixed according to the following formula:

Three parts French Gray Velumina,
One part Silver Green Velumina.

INSETS—Silver Green Velumina.

BEAMS—Gold Bronze. Stencil and decorations as shown.

WOODWORK—Stained with Pitcairn Extra Dark Mahogany Stain No. 15, varnished.

SEATS—Stained with Pitcairn Silver Gray Acid Stain and varnished.



COLOR SUGGESTIONS



Color Suggestions for Subject on Opposite Page

CEILING—Patton's Velumina intermixed according to the following formula:
Two parts Light Buff Velumina,
One part Pearl Gray Velumina,
One part Ivory Velumina.

WALLS AND BEAMS—Pitcairn Banzai Enamel Egg-Shell Gloss tinted to match ceiling.

Color Suggestions for Subject Above

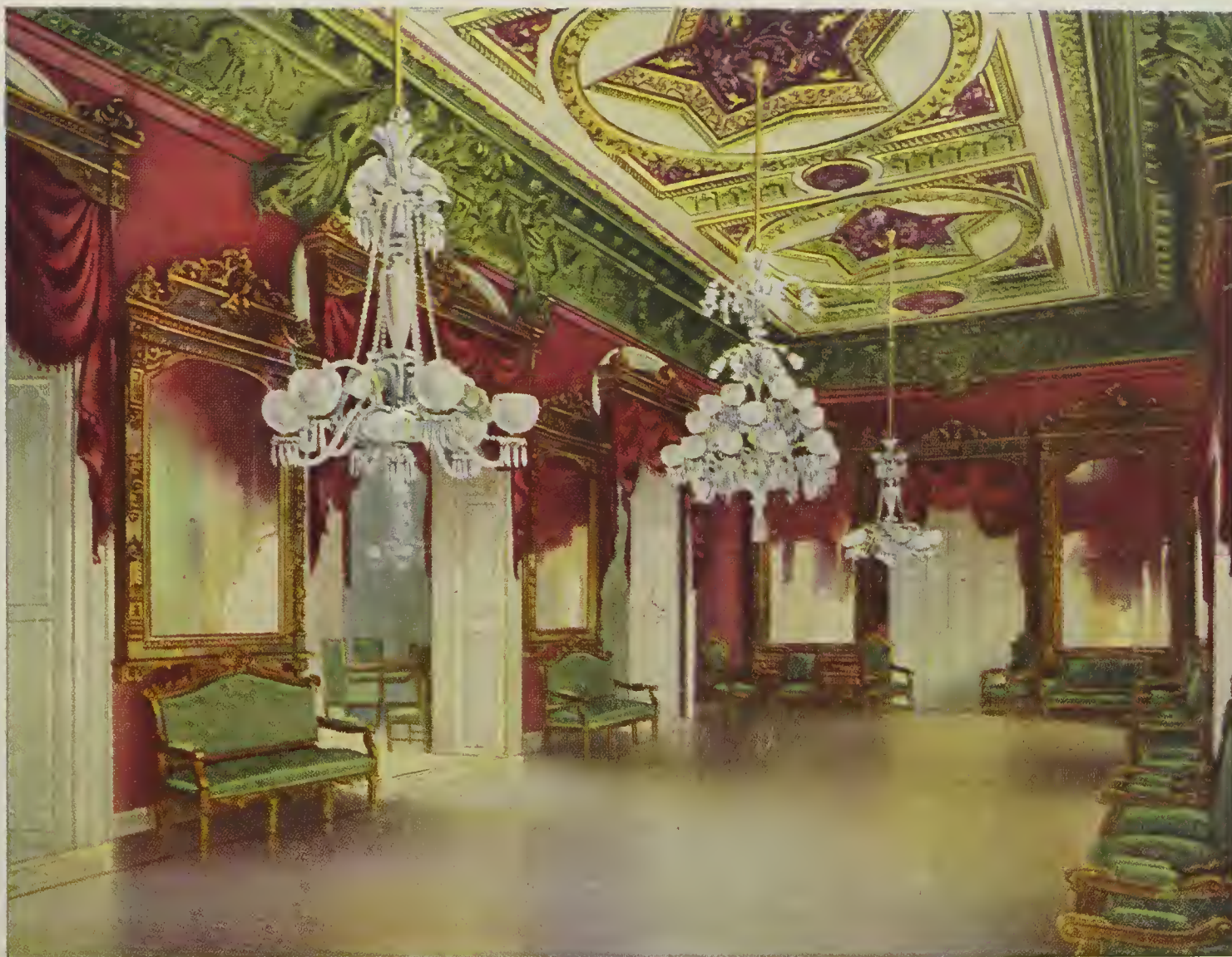
WALLS AND CEILING—Patton's Velumina intermixed according to the following formula:

One part Light Buff Velumina,
One part Pale Raspberry Velumina.

WOODWORK—Stained with Pitcairn Dark Mahogany Stain No. 10, varnished.



COLOR SUGGESTIONS



Color Suggestions for Subject on Opposite Page

CEILING—Patton's Velumina intermixed according to the following formula:

Two parts Medium Buff Velumina,
One part French Gray Velumina,
One part Nile Green Velumina.

BORDER AND MOULDING—Velumina intermixed according to the following formula:

Two parts French Gray Velumina,
One part Light Buff Velumina,
One part Nile Green Velumina.

WALLS—Ground Tone, Circassian Brown Velumina, finished in Tiffany effects by use of Yellow, Green, and Blue Oil Colors.

WOODWORK—Stained with Pitcairn Wood Stain No. 12, varnished, and rubbed dull.

FLOORS—Stained with Pitcairn Early English Wood Stain No. 12, varnished.

Color Suggestions for Subject Above

CEILING—Patton's Light Cream Velumina. Decorations in gold leaf and red. Border in green bronze.

WALLS—Deep Red, made with Patton's Oil Colors thinned with Turpentine.

WOODWORK—Banzai Enamel tinted to ivory.

FLOORS—Natural, varnished and waxed.



COLOR SUGGESTIONS



Color Suggestions for Subject on Opposite Page

CEILING—Patton's Rich Cream Velumina.

WALLS—Velumina intermixed according to the following formula:

Two parts Light Buff Velumina,
One part Medium Buff Velumina,
One part French Gray Velumina.

BEAMS AND WOODWORK—Banzai Enamel tinted a very light gray.

DOORS—Stained with Pitcairn Dark Mahogany Stain No. 10 and varnished.

FLOORS—Natural and varnished.

Color Suggestions for Subject Above

CEILING—Velumina intermixed according to the following formula:

Three parts Pearl Gray Velumina,
One part Pink Velumina.

BEAMS—Same as ceiling, with stencil design as shown.

WALLS—Dado: Circassian Brown Velumina.
Top Walls: White Velumina tinted with Patton's Oil Colors.

WOODWORK—Stained with Pitcairn Stain No. 11 and varnished.

RAILING—Stained with Pitcairn Stain No. 10 and varnished.

STAIRWAY—Natural. Varnished.

CENTER PILLARS—Top: Stained with Pitcairn Stain No. 10 and varnished.
Bottom: Carrara Glass.

SIDE PILLARS—Pitcairn Banzai Enamel.

FLOORS—Tile.



COLOR SUGGESTIONS



Color Suggestions for Subject on Opposite Page

CEILING—Equal parts White and Pearl Gray Velumina.

WALLS—Velumina intermixed according to the following formula:

One part Pearl Gray Velumina,
One part Silver Green Velumina.

WOODWORK—Banzai Enamel tinted a very light gray.

FLOOR—Natural and varnished.

FIXTURES—Banzai Enamel tinted to match woodwork.

Color Suggestions for Subject Above

CEILING—Velumina intermixed according to the following formula:

Two parts Ivory Velumina,
One part Silver Green Velumina,
One part Pearl Gray Velumina.

WALLS—Velumina intermixed according to the following formula:

Two parts French Gray Velumina,
One part Light Buff Velumina,
One part Nile Green Velumina.

WOODWORK—Stained with Pitcairn Dark Mahogany Stain No. 10 and varnished.

FLOORS—Pitcairn Stain No. 6, varnished.

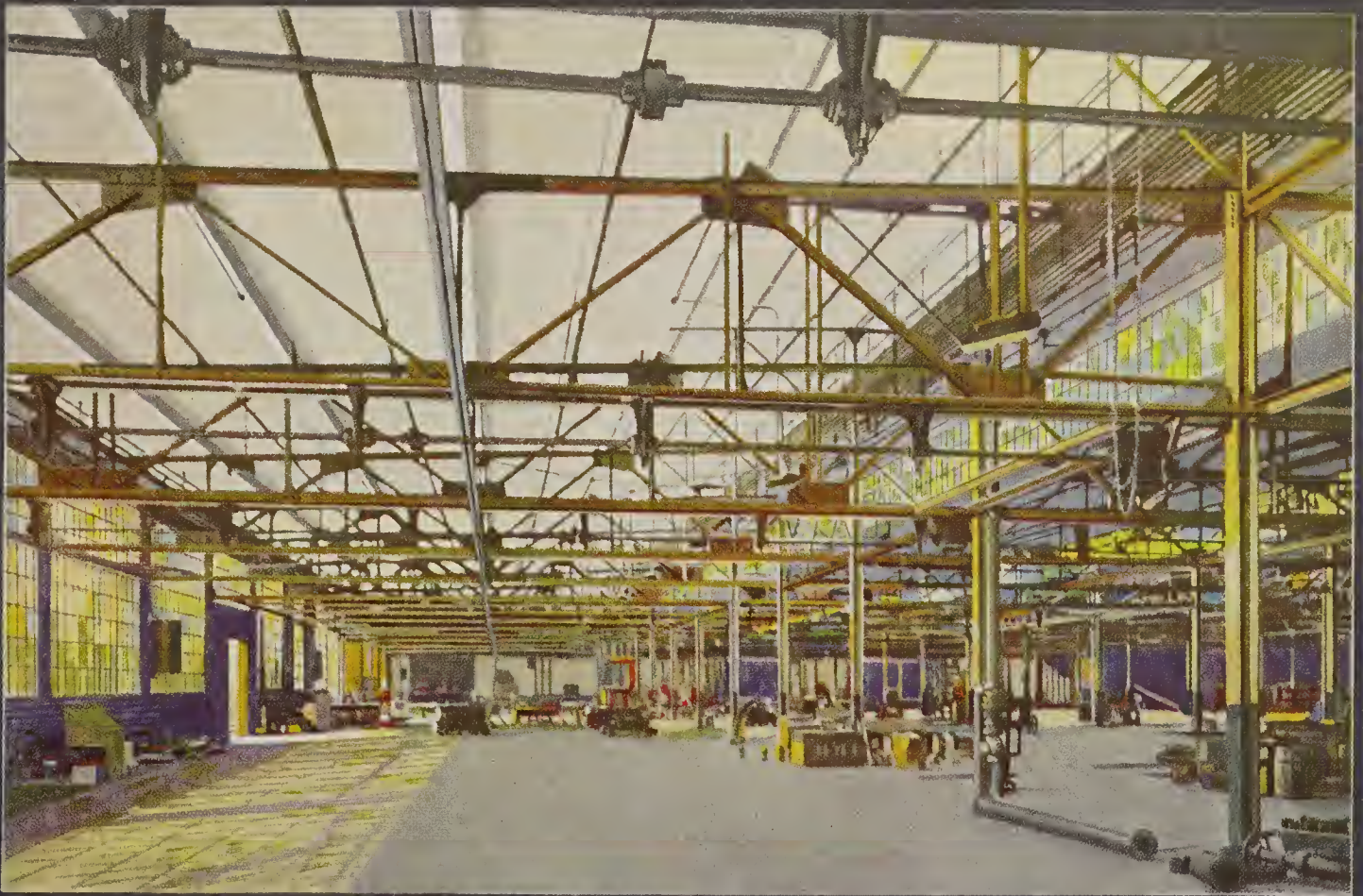
SEATS—Tops: Stained with Dark Mahogany Stain No. 10 and varnished.

Backs and seats: Natural and varnished.



WALLS AND CEILING—Special shade of Velumina known as Woolworth Buff. DOORS AND OTHER TRIM—Metal, varnished.

COLOR SUGGESTIONS



UPPER SUBJECT—Patton's Ironhide on metal, Patton's Alba-Lux on ceilings and walls.
LOWER SUBJECT—Patton's Alba-Lux on ceiling, walls, and pillars.

“SAVE THE SURFACE AND YOU SAVE ALL” PAINT AND VARNISH

UNDER this slogan a campaign of education was launched in 1919, by paint and varnish and allied interests, for the purpose of getting the whole American public to use more paint and varnish, and to demand the proper finishes on manufactured articles which they purchase.

The appeal of this propaganda is directed to the individual's natural interest in what he owns. There are but few kinds of property that will not have a longer life, have greater value, and give better and longer service when they have the protection of paint and varnish. Every phase of activity, every ramification of the Save the Surface Campaign, every dollar spent on it, has for its immediate or ultimate purpose a single object common to the needs of everybody in the paint and varnish business—to educate and to actuate the public to a wider and more frequent use of paint and varnish.

The slogan “Save the Surface and you Save All—Paint and Varnish” has become widely known. Its influence has done much to change

the public attitude toward paint and varnish, but there is still much to be done. Formerly considered as luxuries, largely for the purpose of beautification, these products are now being used as prime economic necessities for the preservation of property, for cleanliness, and for their influence on morale.

From the standpoint of the industry, the Save the Surface Campaign has done more than to create new markets and outlets for its products. Representing as it does a sales appeal common to every factor in the industry and sound as regards public policy, the Save the Surface Campaign has been the means of uniting the industry in an organized body, working efficiently in the public interest for surface protection of property.

The Pittsburgh Plate Glass Company has been a consistent contributor to this movement and heartily indorses it. It is a campaign for the entire industry and will benefit alike the manufacturer, jobber, dealer, painter, and consumer. Each should contribute to its success by active co-operation with the national movement.

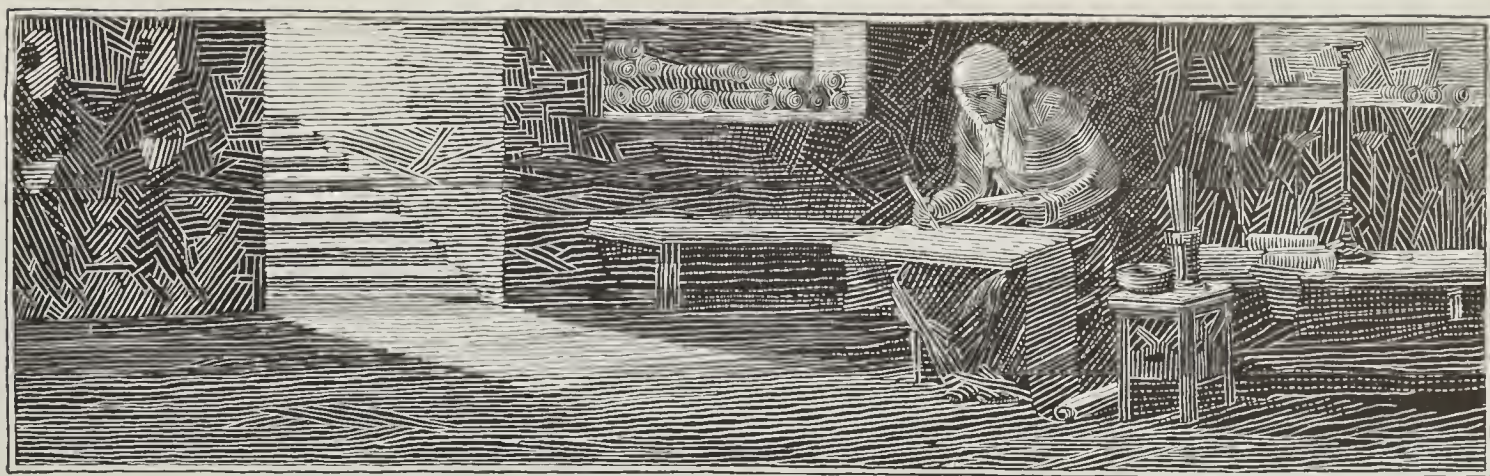


BRUSHES

“The Brush—As Important as the Paint or Varnish”



THE REED CUTTER



THE BRUSH—ITS HISTORY

AMONG the implements which have been used by man in his advance in civilization, the brush has played a most important part. From the earliest days man has had the desire to express his thoughts and to chronicle events—first evidenced in picture writing; but it was not until liquid paint came into use among the Egyptians that there was need of a brush. Previously colored earth had been used, applied in the fashion of a crayon.

“The Egyptians had neither pencil nor stylus,” wrote Maspero, the French archæologist, “but they used reeds, the ends of which, soaked in water and split into minute fragments, formed a brush more or less fine according to the size of the stem.” With this simple tool were laid on the brilliant colors recording the great and intimate happenings and emotions of an unparalleled civilization.

In the British Museum there are specimens of the tools and instruments used by these Egyptian painters, including palettes, remains of colors, a color box, and three brushes which appear to have been made of reeds or from the fibrous stem of palm leaves.

The Greeks of the time of the Ptolemies used the tails and feet of small fur-bearing animals as brushes. To that age may be traced the origin of using a hare’s foot for applying grease paints by the members of the theatrical profession.

With the abandonment of the old schematic painting by the great Greek painters, led by Apollodorus of Athens, who flourished about 404 B.C., these Greeks developed brushes more suitable for reproducing the forms and colors of nature. At first they were made of tiny feathers, then of hair, and later of bristles set into handles of terra cotta.

Pliny “The Elder,” the celebrated Roman naturalist, who perished in the eruption of Vesuvius 79 A.D., writing in his history of art says of Apollodorus that “he first bestowed true glory on the brush”; and of a contemporary of Apollodorus he wrote: “Zeuxis . . . gave to the painter’s brush the full glory to which it before aspired.”

With the death of the civilization of Greece and Rome, art, with its demand for brushes, was lost in the Dark Ages until the dawn of the Renaissance. With the study of the literature of ancient Greece, brought into Italy by the Byzantine scholars, began the

transition from the medieval to the modern world and the revival of classic art.

The birth of this new art brought forth the artist brushes much as we have them today. Cennini in his "A Treatise on Painting," written in 1437, says, "But you must first know how to make use of them [colors], and this you cannot do without brushes. Two kinds of pencils are necessary, namely, pencils of miniver [probably ermine] and of hog's bristles." He then proceeds to tell how the brushes are to be made, for in those days the artist had to be a brush artisan as well.

The soft-hair brushes were made in quills much as they are made today; the others were made of bundles of hog's bristles bound securely to a round stick with waxed thread. A little later brush-making became an indus-

try and brush-makers' fraternities or guilds, as they were called, were organized in France and England and special privileges granted them. From the early Thirteenth Century it was the custom in England to whitewash the exterior of castles and then later to paint them with the colors red, blue, and green. It is evident from Cennini's "Make a large brush in which you put a pound of bristles, and bind them to a large stick . . . you may use this for whitening walls," that thus was born the "pound brush" used until even this day.

We find records of flat brushes (made of the "Stucco" type) being used in England about 1840, but it remained for the American brush industry to develop the flat paint and varnish brush to its present practical shape and design.





BRISTLE AND WHERE IT COMES FROM

IT IS doubtful if in any other of the arts or manufactures a basic material, as important as bristles are to the brush industry, is so dependent on the peculiar tastes and customs of any people. Bristle is a by-product, salvaged from swine when they are killed for food. Pork is an important article of diet in most civilized countries, but were all who eat it of the same taste as we in this country, who relish it only

when fat and young and tender, other materials than bristle would have to be found for paint and varnish application. Swine domesticated, carefully bred for food, and slaughtered as soon as they grow to maturity, do not produce bristle of length sufficient for brushes. The species of the swine and the climatic conditions under which they are grown, do, of course, influence the length and character of the bristle produced, but the



A Chinese Boar

Note the marked difference between the bristle carried by the Chinese Boar and that which we are accustomed to seeing on native swine.

PITTSBURGH PLATE GLASS COMPANY



From an actual photograph

Drying Bristle

Drying bristle in China before its preparation for shipment.



Samples of Chinese Bristle

Showing several lengths and qualities, and examples of the Chinese wrapping.

BRISTLE AND WHERE IT COMES FROM



Several Samples of Russian Bristle

Contrast this with the neat way in which Chinese bristle is wrapped, as shown on the preceding page.

age at which the animal is killed, as much perhaps as anything else, determines the value of the bristle for brush-making. The Chinese have long been known to value food by its age, and depending as we do on China for a large part of our bristle supplies, we should be grateful for it.

Bristles are so peculiarly suited to brushes that no substitute for them has ever been found or devised. Their consistent elasticity in most paint vehicles and the peculiar split end or "flag," which serves the double purpose of carrying the paint and spreading it evenly and smoothly, are advantageous properties of bristle distinctly its own.

As the average contribution of a Chinese pig is less than a pound and a half of bristle suitable for brushes, some idea may be had of the difficulty of obtaining supplies in quantity sufficient to keep pace with the ever increasing consumption of paints and varnishes.

Bristles are obtained in Poland, Russia, Siberia, Bessarabia, Turkey, France, India, and China, the most valuable coming from the colder

climates where the swine are least domesticated. It is within the last thirty years that the marketing of bristle has become an industry in



A Bargain in Bristle

It is here that the merchant makes his contract with the Chinese for future delivery.

China, but records of the collection and sorting of bristles in other countries date back over a century. Before the World War the best bristle came from Siberia and Russia, being brought in a raw state to the fairs at Irbit and Nizhni Novgorod, the latter the largest merchandise fair in the world, from which it was sent to Petrograd or Leipsic; both are old, established markets, probably the oldest in the world.

In recent years the advantages of Chinese bristle have been exploited by the American manufacturers and by far the greater part of the bristle marketed in China has found its way into American brushes.

European and Siberian bristles are white, yellow, gray, and black. Chinese bristles are white and black, only the black Chinese being used in paint brushes.

Bristles are to be found in every province of China and vary in quality, elasticity, and taper with the province from which they come and the methods of dressing peculiar to that province. Pigs are kept in great numbers; many millions



Samples of Tampico and Horsehair

Tampico is used only in cheaper grades of special brushes.



A Bristle-Dressing Room in China

Here the bristle, after being dressed to a certain degree, is wrapped in small bundles and packages, as illustrated on page 128, in preparation for shipment abroad.

BRISTLE AND WHERE IT COMES FROM



From an actual photograph

Washing Bristle in China

This is only a superficial washing; all bristle must be washed again before careful manufacturers make it up into brushes.

of them are raised each year. After a pig is slaughtered, boiling water is poured over the carcass and the hairs are scraped off with an iron scraper. Only the stiff hairs on the back are

dressed for bristle; the shorter soft hairs that grow on the belly and legs are used for fertilizer by the native farmers or made into rope. The dressers send their buyers to the different districts of the country to purchase these raw bristles. The bristles are put into gunny sacks and transported on horseback or wheelbarrow to the godowns, or shops where they are dressed.

They are first washed and then combed out with wooden combs to clean them well and to remove all foreign matter and short hair. They are then arranged according to lengths, tied in bundles about an inch and a half in diameter, and wrapped, two bundles in a paper package, which is marked with the size and packer's brand. Packed in cases containing one hundred and ten or one hundred and thirty-three pounds, they are ready for market.

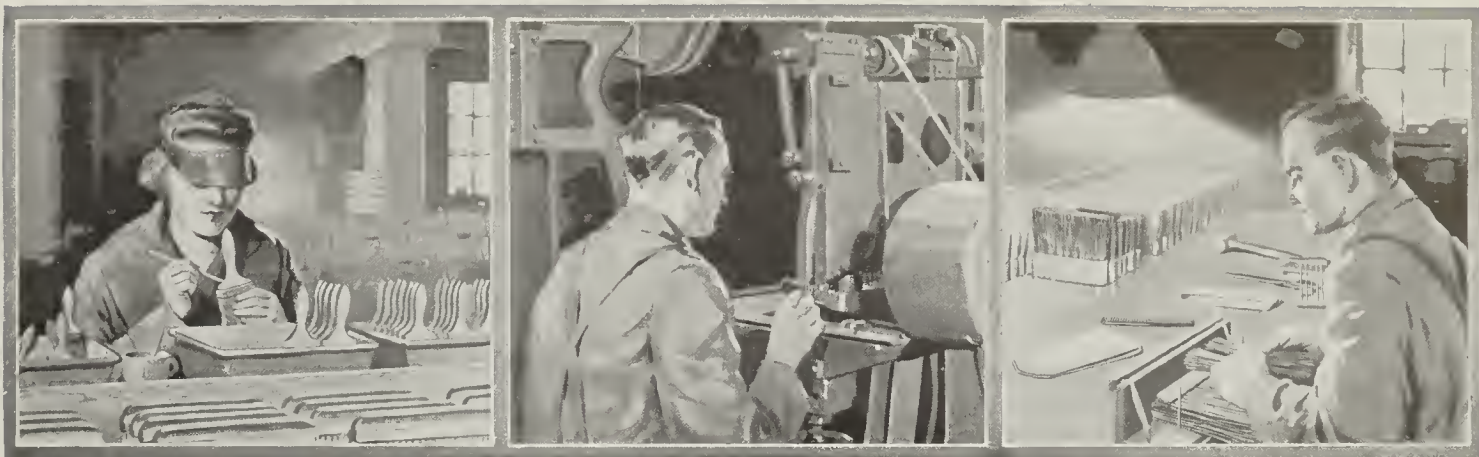
Bristles are collected in China during the months between October and March, because in these months fish are scarce and the natives slaughter pigs for their New Year festivities. It is for this reason that the Chinese bristle market opens in March. The greater part of the year's output is invariably contracted for within sixty days thereafter.





PHOTO AMERICAN AIRCRAFT CO.

The Plant of the Rennous-Kleinle Division



DEVELOPMENT OF THE AMERICAN BRUSH INDUSTRY

MODERN paint and varnish brushes owe their present state of perfection to American ingenuity, thoroughness, and skill. France, perhaps, can still claim leadership in the manufacture of fine artist brushes, but American-made painters' tools, brushes of American design and type, are in every way superior to anything made in any other part of the world.

Brushes had been made in a commercial way across the seas long before the industry became established here. It was not until the early part of the last century that paint brushes were made in this country, though paints had been extensively used for many years. The industry has been developed, especially in the last twenty-five years, until the fame of our brushes has traveled



A View in One of Our Storage Rooms

Bristle in storage at the Rennous-Kleinle plant before the cases have been broken open. These goods alone represent an investment of approximately \$750,000.

PITTSBURGH PLATE GLASS COMPANY



Cupping Bristle

The first step in the straightening process



The Next Step

Laying out the bristle in preparation of the batch formula;
the first step after straightening.

around the globe, and they are being used in every civilized country in the world. Is it not strange that bristle from Russia should be brought to America, made into brushes, and sent back again? And that China, which has used brushes for writing for thousands of years, is using American paint and varnish brushes made from the bristle of her own hogs?

It was in 1850 that our own brush factory had its beginning, with Baltimore, Maryland, as its birthplace. This plant, started in a small way, with highest quality for its standard, soon established for itself in the mind of the painter a reputation for the best in painters' tools. Progressive, quick to approve and adopt new and better methods, its business steadily grew, as did the reputation of its product.

Until 1891 the only bristle used, with the exception of very small quantities of domestic bristle, came from Russia, Germany, and France. In that year, after most careful study and exhaustive experiments, Rennous, Kleinle & Company introduced to the world the first full line of black Chinese bristle brushes. At first these brushes were not received with favor, but, when they began to demonstrate their real worth in use, the reputation of the pioneers in their manufacture began to attract the notice of the entire brush-using world. Soon their outstanding advantages and lower cost brought them into general use.

The Pittsburgh Plate Glass Company, as it launched out into the paint business, and came

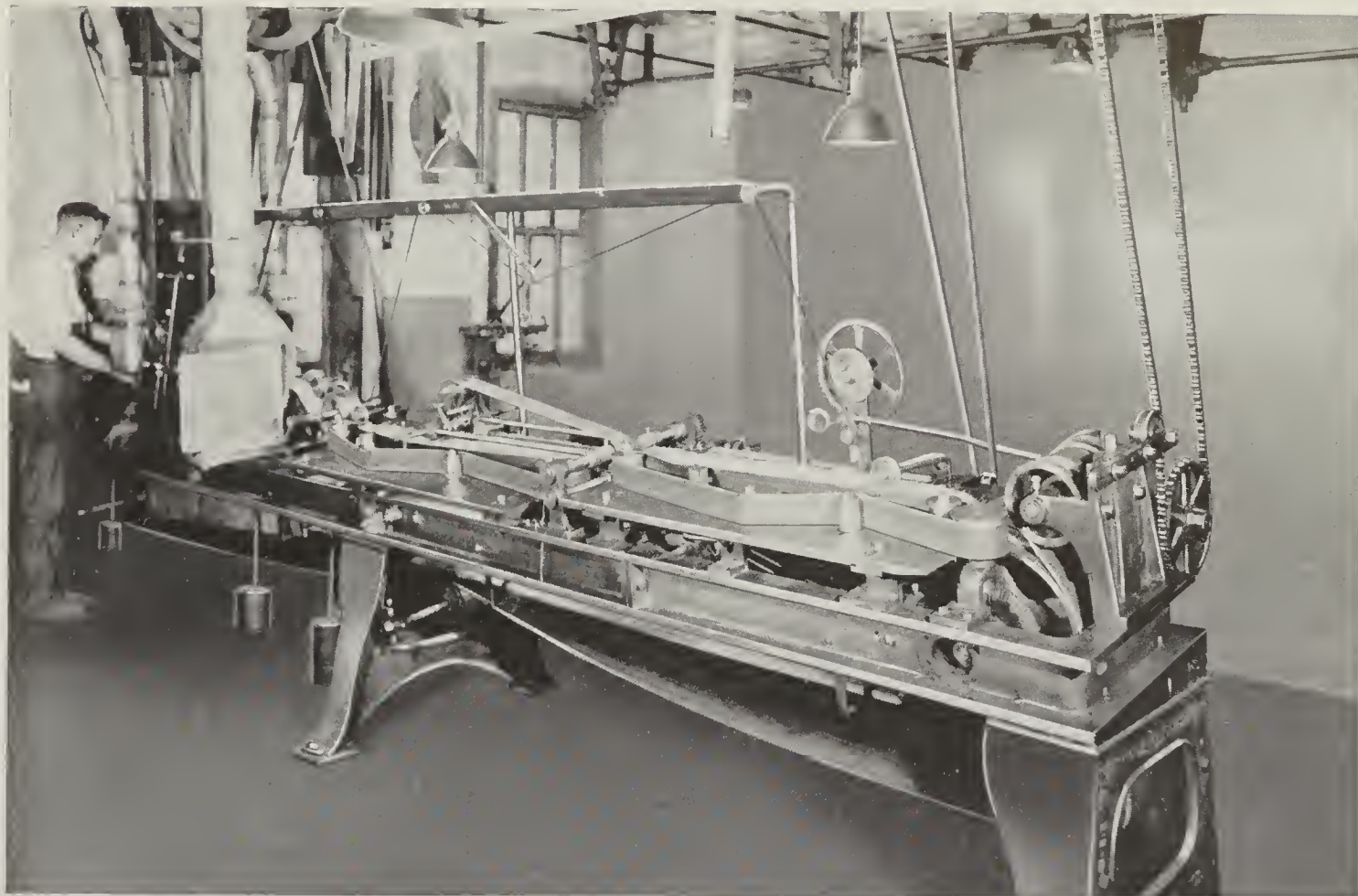
to realize the need of a factory for the maintenance of Pittsburgh quality standards and a dependable source of supply of brushes, acquired in 1901 an interest in the Rennous-Kleinle plant and the Horseshoe Brand. In 1912 Rennous, Kleinle & Company became one of the subsidiary companies of the Pittsburgh Plate Glass Company.

Means for plant expansion were thus provided; with an enlarged organization came more intimate knowledge of the development in paint manufacturing and painting methods. This knowledge suggested and made possible the many important improvements in brush-making so acceptable to the men held responsible for successful results with the new finishes.

On January first, 1921, Rennous, Kleinle & Company was, with other subsidiaries, consolidated with the Pittsburgh Plate Glass Company and is now operating as the Rennous-Kleinle Division.

Brush-making is a complicated process, but devoid of any mystery and, though little understood by those who use brushes, is intensely interesting. It is a modern mechanical method, employing advanced ideas in tools and machinery, and calling for the highest skill on the part of many artisans. The little journey through the Rennous-Kleinle Works that follows describes the more important processes and operations involved in better brush-making.

All bristle, whether European or Asiatic, as it grows on the hog has a natural bend or crook.



Mixing Machine

One of the battery of mixing machines on which the bristle batches are mixed with scientific accuracy.

Although dressed at its original point of collection, some of it even being bought as "straightened," it is still crooked when the brush manufacturer receives it. Under old processes, still followed in the making of some kinds of brushes, especially long-stock Russian bristle calcimine, and fine French bristle artist brushes, this bend, by clever manipulation in the hands of the artisan, is turned in toward the center of the brush. With the introduction of Chinese bristle, more modern and effective methods of handling these bends were found—the bristle is straightened. It is a peculiar property of bristle that when it is put into a liquid, this bend is greatly increased. Obviously, a brush made of unstraightened stock, with these bends running in all directions, would finger and flare and make good work an impossibility.

European bristle is washed with soap and water on a scrubbing board. After a thorough rinsing, handfuls of the bristle are taken and, with the bends all turned toward the center, each handful is tightly and closely wound with string

throughout its entire length. When the bundles are dried and the string is removed, the bristle is straight.

Chinese bristle is straightened by another equally efficient method. Bristle is very absorbent, and it is this property which is turned to advantage in the straightening process. The bristle is tightly packed in perforated galvanized iron cones open at both ends. The cones are then placed in water, containing a soap solution to remove the dirt, and boiled for several hours. The bristles, absorbing water freely, swell and, under the pressure exerted over their entire length, the cones being made of the same relative taper, are made perfectly straight from butt to flag. They are then dried in a vacuum dryer. This washing and straightening of the bristle is the first operation in the making of any brush.

Many kinds of bristle, each with its peculiar properties and several lengths, are utilized in the building of brushes to meet their special requirements. Just as the modern paint chemist uses various combinations of pigments and



Weighing Bristle

In this operation scrupulous accuracy is of the highest importance.



Laying Out Brushes

One of the operations in setting up calcimine brushes.

vehicles to produce his desired results, our brushes are built to formulas as carefully and scientifically predetermined. The batches of bristle and the quantity which go into a brush are as carefully ascertained as the constituents of the batches themselves.

The mixing of the various component parts of a bristle batch is a most interesting process. Here the introduction of modern semi-automatic machinery makes possible greatly reduced costs and better results. An illustration on page 134

shows the workers laying out the eight or ten kinds or sizes of bristle that go to make the batch, each kind or size laid out in a thin layer, one on top of the other, until the required formula has been completed—this preparatory to mixing them. On the extreme right in the same picture a worker is shown mixing bristle by the old method of halving a handful, laying one half on top of the other and repeating this operation until the various sizes and kinds are thoroughly intermixed. After each operation he



Making Varnish Brushes

Setting up flat and oval varnish brushes; these illustrations show clearly the method of chiseling.

DEVELOPMENT OF THE AMERICAN BRUSH INDUSTRY



Setting Up Brushes

Setting up leather bound flat paint or stucco brushes.



Nailing Leather Bound Brushes

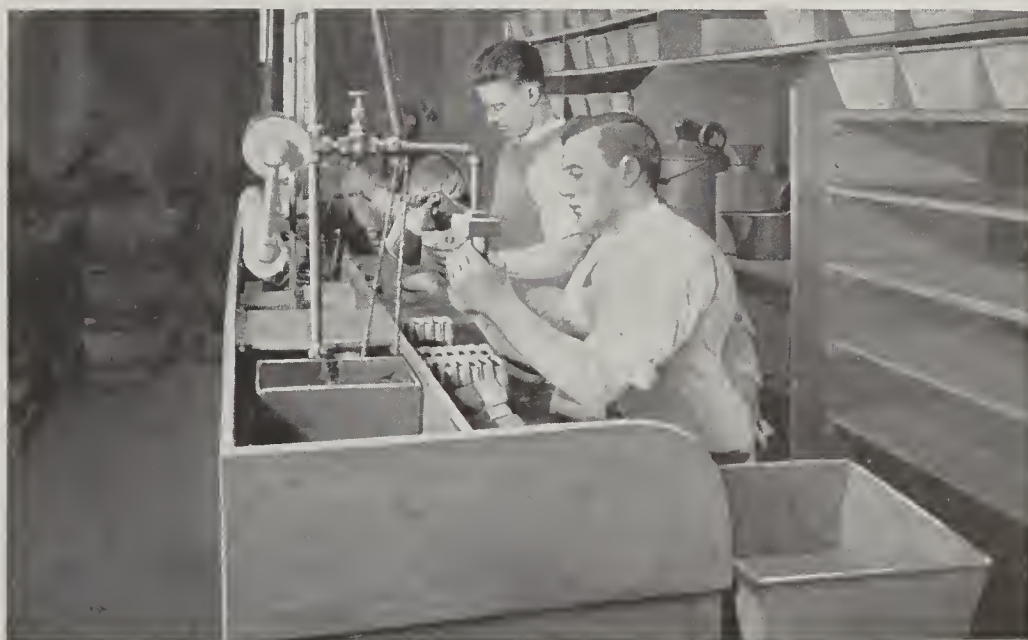
Regular nailing requires a skillful operator.

draws his handful through a bench comb to keep the bristle straight. This rather slow, though effective method has been greatly improved in the machine illustrated, which handles bristle of all lengths and kinds, mixing them thoroughly and with little waste. Numbers of these machines provide the steady flow of prepared bristle to the brush-makers. After a batch is mixed it is carefully bundled and wrapped to preserve it in workable condition; it is then stored subject to the requirements of the brush-making depart-

ments. Several hundreds of these batches are required to make the various sizes of the many kinds of brushes demanded of the industry.

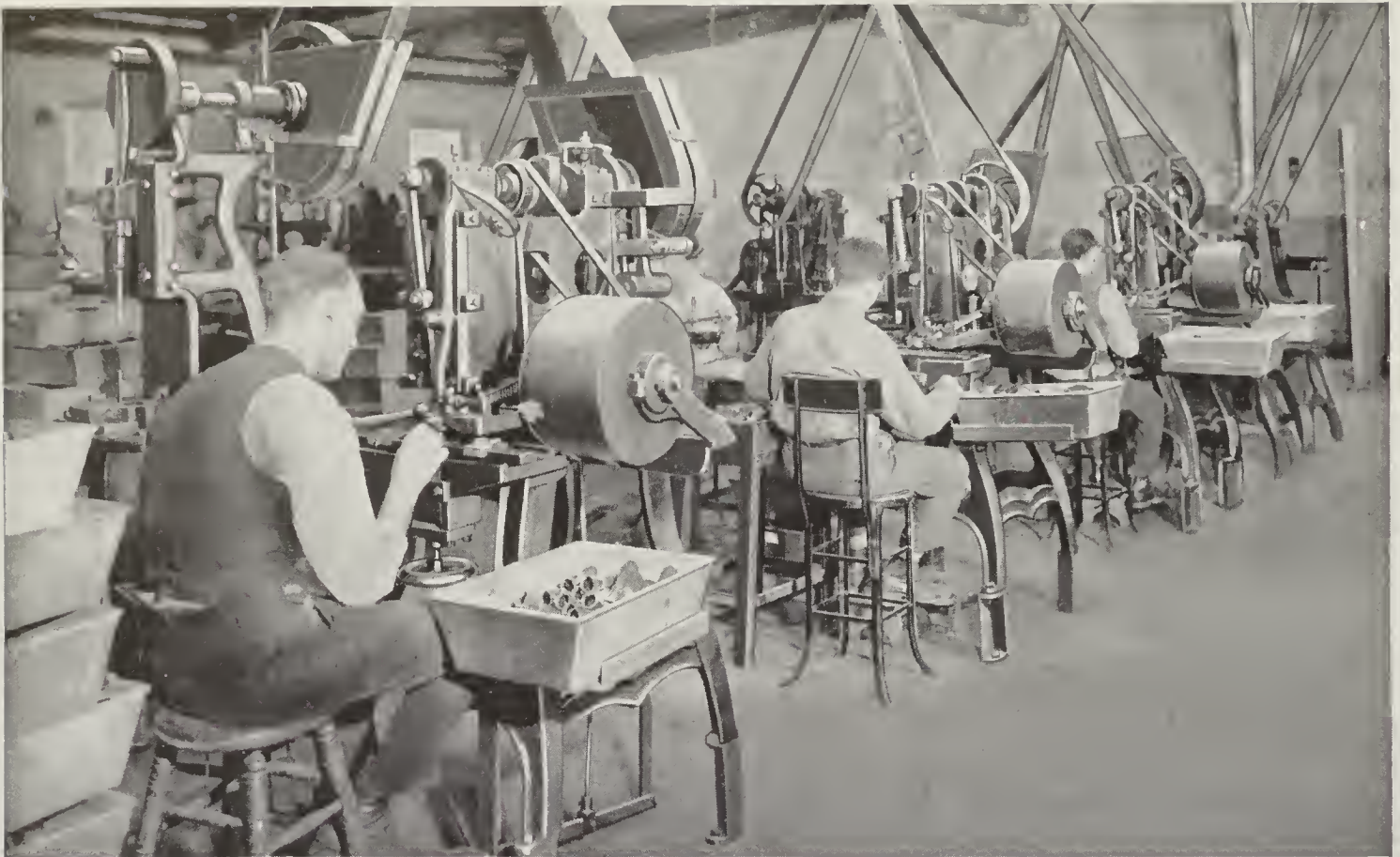
The bristle batch and quantity of bristle which go into a brush are determined with equal care. It will be of interest to follow the processes through which some of the more important kinds of brushes pass.

The brush mostly used by the modern painter is the flat paint brush, either metal or leather bound. The first operation in making is "set-



Cementing Metal Bound Flat Paint Brushes

Note the way in which the cement is first poured and then forced about the bristle by hot compressed air.



Nailing Machines

A force of nailing machines where ferrules are firmly attached to the bristle end of the brush with amazing rapidity.

ting up." The brush formula calls for a certain weight in each brush. The brush-maker carefully weighs out of the designated batch to a variation of less than one sixty-fourth of an ounce the quantity required by the formula, laying the bristle in piles overlapping one another until the required number of brushes is provided for. Next taking one of the little piles and carefully butting the stock down solid, he puts it into the metal band. In the case of leather bound brushes a temporary metal band is used. Then inserting a strip of wood, fiber, or cardboard between the bristle at the butt end, he pulls the bristle through the ferrule to its required length, and carefully combs the bristle so that it will lie perfectly straight. This accomplished, he is ready for the next operation.

Some brushes are cased, that is, the outer part of them has bristle of a different batch than has the middle. This casing of the brush is a simple process. The brush-maker first takes his casing and lays it flat on the edge of his bench, the flag end of the bristle overhanging; the middle is then placed upon the casing. Laying this bristle in

the palm of his left hand, he puts his right thumb into the center of it, closing his left thumb and its handful of bristle around the right one; he withdraws his right thumb and the trick is done.

Here the similarity in the making of the metal and leather bound brushes ceases. The metal bound brush next goes to the cementing bench. Brush-makers' cement is a rather heavy-bodied shellac varnish. It is made of pure rosin-free shellac, with alcohol as a solvent and small quantities of neutral oils added to prevent its drying brittle-hard. This cement is poured into the open end of the ferrule and is then blown under compressed hot air to insure its surrounding every single bristle.

Many brushes are now made with the bristle vulcanized in rubber instead of set in cement or glue. The butt ends of the bristles are thoroughly surrounded with liquid rubber and then vulcanized into a solid block. This process of setting is not complicated, though it involves many additional operations.

The next step is to the semi-automatic nailing machines where the nails are driven through the

DEVELOPMENT OF THE AMERICAN BRUSH INDUSTRY

ferrule and bristle. The nails are then cut off and clinched. The handle is next inserted; the two or three heading nails which secure the handle and ferrule are driven at one operation.

In leather bound brushes the cement is rubbed into the butt end of the brush, after which the temporary metal band is replaced with the leather one. The brush is nailed by hand, when the cement has hardened sufficiently.

The proper taper of paint brushes is obtained by mixing various lengths of bristle in the batch. Varnish brushes, on the other hand, are made of bristle of more nearly the same length. The taper, or chisel, as it is called, is formed by gradually shortening the bristle on each of the two faces. This is done by putting the bristle

flag end down into a cup, the inner shape of which is that desired for the finished brush.

The illustrations of both oval and flat varnish brush-making clearly show the process. This chiseling is never done by trimming or by grinding on an abrasive wheel, or any method which would remove the soft flag ends of the bristle. These are a necessity to good brushes.

Just as care and skill are important in the actual making, so too are they important in the various steps in finishing. The brushes are beaten out to remove any loose bristles, trimmed, buffed, wrapped, and boxed, each operation so performed that the finished product will pass inspection, meeting the Pittsburgh Plate Glass Company standards for the best in brushes.



A Handle-Nailing Machine



Soft Hair Bearing Animals

Principal animals which contribute some part of their fur to the manufacture of high grade soft hair brushes.

- (A) Siberian Squirrels, the trade name for whose fur is Camel Hair. (B) Civet (Spotted Skunk). (C) European Badger.
 (D) American Badger. (E) Mink, whose fur is known to the trade as Red Sable. (F) Skunk. (G) Genet.



SOFT HAIR—WHAT IT IS AND WHERE IT COMES FROM

BRISTLE, because of the great quantity used in brush-making, has elevated the boar to a position of importance in this industry, but other animals also play a material part in making possible much of the decorative and preservative painting and varnishing of today.

The brushes used by painter, decorator, and artist are broadly classified as bristle brushes and soft hair brushes. Were it not for the ox hair used, the term "fur brushes" would be more descriptive than "soft hair," for we depend upon our fur-bearing animals, particularly the various members of the weasel family—the sable, kolinsky, skunk, and badger, for the material used in many brushes. Goat hair is used for some of the cheaper brushes.

Although a substantial amount of this material is obtained in our own country, much of it is to be found only in the innermost sections of Siberia.

The soft, straight hair, of which the so-called camel hair brushes are made, is clipped from the tails of Russian and Siberian squirrels. These are better furred than the American squirrels, whose hair is not suitable for brushes.

It is an interesting and notable fact that the fur of the squirrel, which is red in Germany, becomes gray in the winter coat as we approach the eastern part of Europe, growing darker and darker as we journey east, until it reaches an almost black color along the Pacific coast. Thus,

while all members of the same family, these little animals produce hair of entirely different colors, though much the same in quality.

This hair is classified as Kazan, Sakkamina, and Talahutky. The province of Kazan furnishes red and reddish gray skins. Light blue skins are found in the Yeniseisk, and skins of deep, steel blue color in the province of Yakutsk in far eastern Siberia. These are the Sakkamina squirrels; the hair is usually referred to by the trade as "blue." Talahutky squirrels from southern Siberia are scarce and the hair is used only in lettering and striping brushes. It is gray with a pronouncedly darker stripe near the tip. It resembles badger hair in appearance, though much finer.

Squirrel hair is straight and fine in texture, but not very elastic. It makes an ideal brush for applying japan colors, lacquer, and similar light-bodied varnishes, and for fine bronzing. It is used for lettering and striping brushes, but is not so well suited to this purpose as sable or ox hair.

Of all the furs used by the brush-maker the most valuable, perhaps, is red sable or Siberian mink. This hair is very fine, has strong, sharp points, great elasticity, and carries color well. It is used exclusively for fine artist and lettering brushes. The red sable, or kolinsky, as it is called by the furrier, is about fifteen inches long, has an eight-inch tail, and is of a rich yellow or brownish yellow color—it is not red. It is found



Soft Hair

Some of the many materials used in soft hair brushes. The 6-inch scale at the right will give an idea of the length of the hair.

in Siberia in the district east of the Yenesei River. Comparatively few of these animals are caught and the fur is very expensive.

The finest lettering or striping brushes are made from the tail hair of the sable of Russia and Siberia, called black sable by the trade. This hair is straight, elastic, of uniform taper, and has splendid points; it is especially desirable for the longer lettering and striping brushes. As it is scarce, there are many substitutes, though nothing serves so well. The so-called black sable used in sign writers' and flowing brushes is civet.

Civet hair is obtained from the tail of the civet cat of commerce. (This animal should not be confused with the civet cat of Africa, which it does not resemble in any way.) It is the little striped skunk found chiefly in our western, central, and southern states; this animal is not so large as the true skunk, being only about one foot long, but having a tail nearly as long as its body. The body is black, marked with white square-like patterns—designs unusual in nature. The tail hair, which is black and very long, is straight and regular, has good points,

and is fairly elastic. It is used for lettering, striping, sign writers', and lacquering brushes, and when so used is often called black sable.

In this country, so-called fitch hair is clipped from the tails of the American skunk. The general color of the animal is brownish black. It has a tip of white on the head and is marked on the back with white stripes of considerable variation; the long, bushy tail has a white tip. The skunk is found in almost every part of the United States, but the quality of the hair varies. The finest skins come from Michigan, Ohio, New York, Pennsylvania, and the lower Dominion of Canada. The hair of the animals found in these sections is blacker and more regular in form, with greater tensile strength and better points. (Tail hair only is used in brushes—the black in fitch brushes, the white mixed with badger to reduce the cost of badger brushes.)

Skunk hair is not used alone to any great extent. It is too coarse to substitute for civet and has not sufficient elasticity for good varnish flowing brushes. When mixed with Chinese bristle in proper proportion it makes an excellent

SOFT HAIR

brush. The hair of the American black bear, while sometimes employed in brushes, is never used alone. Though of great strength, it is too kinky to be used in large proportion; it is used mixed with bristle, skunk, or other hair.

For many years the carriage painter has looked upon badger as the only hair for flowing varnish brushes. While their cost does restrict their use to a degree, there seems to be an increasing demand for badger brushes. Badger hair is very elastic and has greater tensile strength than any other soft hair; it makes the best possible brush for flowing carriage or automobile varnishes.

The badger is found throughout Europe, Asia, Canada, and the central and western portions of the United States. The best hair comes from Russia, Siberia, Macedonia, and the Balkans generally. The cost of imported badger skins, however, has encouraged the greater use of American hair, although the latter is too soft for the better grades of brushes.

Cattle, too, contribute to brush-making; the long, soft hair which prevents insects intruding too far into their ears, makes excellent flowing brushes for enamel and color varnishes and for certain kinds of sign writers' brushes. The best ox hair comes from Europe; it is lighter in color, stronger, and more elastic than the American hair, though some excellent brushes have been made from our own product.

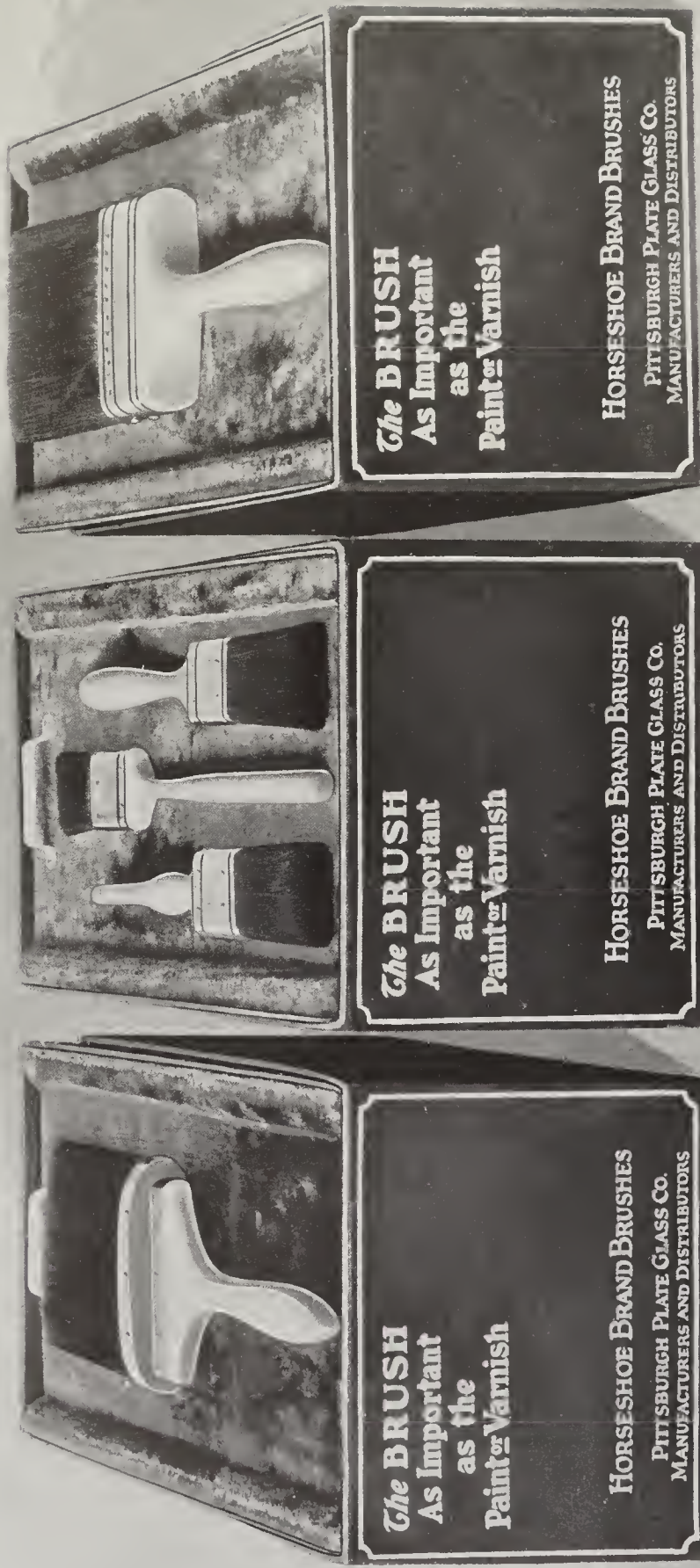
Goat hair is the least important of the group. It is largely obtained from pieces salvaged when making goatskin robes and coats. It lacks elasticity and its natural kink cannot be straightened. It is used either in its natural brown color or dyed black for the cheaper grades of mottling and bronzing brushes.

Japanese pony hair has little value though it does masquerade as "camel hair." Genet, the dyed tail hair of the ringtail and other wild cats, is also used as a substitute for squirrel; it is soft, silky, and of attractive appearance.

The preparation of soft hair is tedious and costly. When the tails are received they are put into revolving drums and treated with hot sawdust to remove the dirt and animal fat. The hair is clipped close to the skin, carefully washed and rinsed, then put into small bundles and wound with string to straighten it. When it is dry it is combed to remove all wool and dragged into lengths. Great skill is necessary to avoid tearing or destroying the points, as these points mean everything in soft hair brushes. Badger hair is pulled from the hide. It is washed, dragged, and dressed as is other soft hair, but in addition is bleached to make it as white as possible.

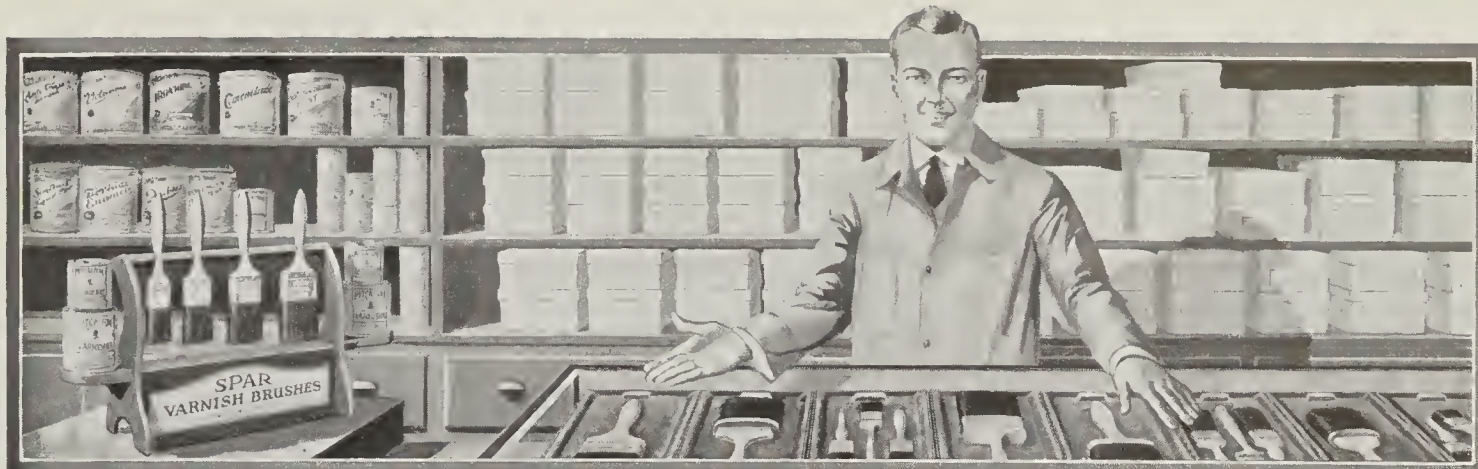
Acknowledgment is made to Gerrit S. Miller, Jr., of the Smithsonian Institution, United States National Museum, for his helpful criticisms and suggestions in compiling information on soft hair bearing animals.





Brush Display Boxes

Display boxes given without charge to dealers as one of the many ways in which the Pittsburgh Plate Glass Company helps the dealer to dispose of his merchandise.



MERCHANDISING BRUSHES

THE American Master Painter is more fortunate in the brushes available for his needs than is his fellow artisan in other countries. Although brushes were made elsewhere many years before the industry was started in America, the thought and care devoted to the art of brush-making by our manufacturers here have made possible better and more practical brushes than are to be found in other lands.

The American types, with few exceptions, are distinctly different. Our characteristic habit of making things to produce best the work expected of them, of departing from old ideas and quickly adopting new ones immediately their worth is proved, has created brushes of notably better quality, brushes, indeed, producing more and finer work.

In this development the Rennous-Kleinle Division has been for many years among the foremost, contributing its full share of improvements and refinements in manufacture and many new types of brushes that have added greatly to the efficiency of painting.

The acquisition of Rennous, Kleinle & Company by the Pittsburgh Plate Glass Company brought resources in knowledge of materials and painting methods which have made possible a

most comprehensive development of brushes for the master painter. In touch at all times with changes in paint- and varnish-making, we are constantly improving brushes to meet the needs of the new painting methods.

We qualify as specialists in the making of painters' tools and recommend only brushes that we know are practical and economical to use.

We illustrate and describe here a number of lines of brushes; while they are but general examples of Rennous-Kleinle manufacture, they are the best of their types. We recommend them to the painter with the assurance, founded on years of their success, that better brushes cannot now be made.

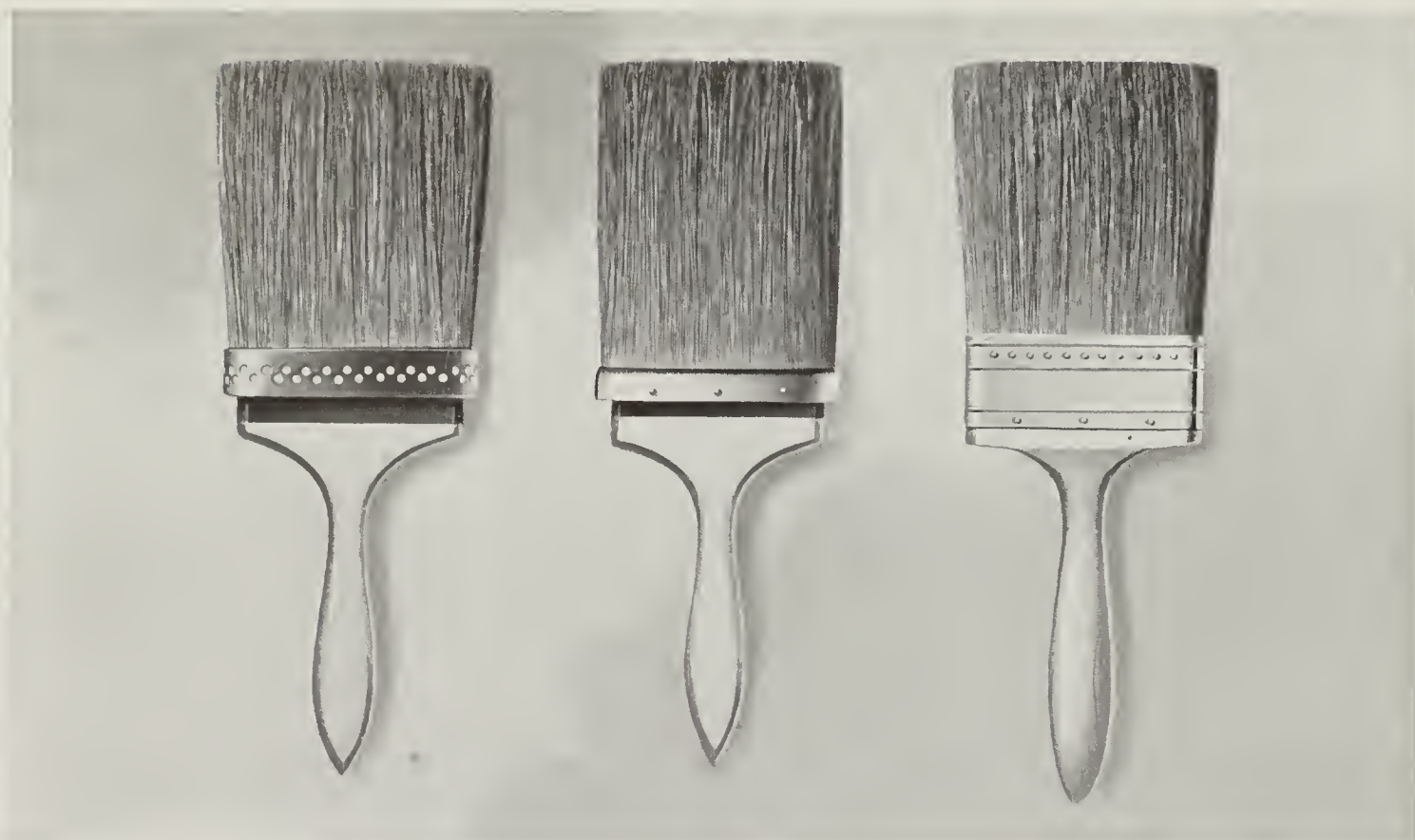
The *Extra Black Stucco* Leather Bound Flat Paint Brush has for many years enjoyed a larger sale and use than any brush of similar kind. It is made of pure black Chinese bristle—a mixture of several kinds and lengths to pro-

duce a brush satisfactory not only when first put into work, but one which gives complete satisfaction throughout a long life. It is a brush that needs no breaking in.

This brush contains much stock; it is a quarter of an inch oversize; but it is made with such refinement and consideration for balance that it



*Brushes of
Oriental Manufacture*



The Three Leaders in the Brush Industry

The *Extra Black Stucco*, Leather Bound, *Steelbound*, Metal Bound Stucco Type, and *Best Black*, Metal Bound, Flat Paint Brushes.

is more satisfactory than most brushes made with less stock. It is made in all widths and will do much more work than most stucco brushes.

The *Steelbound* is a metal bound brush of the stucco type; it is a recent development. In creating this excellent master painter's tool we have successfully avoided the criticism leveled against attempts to make a similar metal bound stucco: that of being too heavy and awkwardly out of balance.

Our metal bound stucco is made with a very narrow band, so light that it balances perfectly. This brush has won many friends among users of both leather and metal bound brushes, since it combines advantages of both types. It is made of the same carefully selected Chinese bristle used in the leather bound stucco and is vulcanized in rubber. It is recommended as a highly satisfactory painter's tool.

Many painters prefer the metal bound or so-called wall type of brush. To these men we recommended the *Best Black*, a brush made of the same stock used in our best leather bound brushes, and a brush made with every consideration for the master painter's needs. The

brush is proof against shedding. It is a tool of such pre-eminent quality that it dominates an overcrowded field.

In many parts of this country the oval style paint and varnish brush, an outgrowth of the old "pound" brush, is now extensively used. As these brushes are now made, slightly oval and chiseled ready for use, they have great merit.

Efforts have been made to manufacture brushes of this type with a so-called solid center construction. We too make a solid center oval, but find these latter brushes less elastic, more difficult to keep clean, and of shorter actual wearing length than the open center oval.

We are decidedly in favor of the open center brush and recommend to users of oval paint and varnish brushes our *Useful* as the highest-grade brush of the type.

For varnishing, this brush in the smaller sizes or a similar one, such as the *Mikado*, is suggested with confidence in your satisfaction.

Many master painters prefer flat brushes for varnishing or enameling, and with a full knowledge of the requirements for the proper application of modern varnish and enamels, we created,

MERCHANDISING BRUSHES



Paint and Varnish Brushes

Moderate-priced brushes that are designed for severe service: the *Black Filler Metal Bound Flat Paint*, *Chang Flat Varnish*, *Master Painter Metal Bound Flat Paint*, *Four-Fifty Flat Varnish*, and the *Arkay Metal Bound Flat Paint*. All of these brushes enjoy tremendous popularity.

several years ago, the master brush which is now known as the *Apollo*. The *Apollo* was offered for sale only after exhaustive tests in the hands of practical master painters; we recommend it as fully embodying the most comprehensive knowledge of brush requirements.

The *Apollo*, like all the other leaders of our line, is vulcanized in rubber and made of pure black Chinese bristle of selected quality. In the larger sizes it is of exceptional merit for flowing either varnish, enamels, or shellae; the one and one-half inch size is an excellent sash or trimming brush.

Our *XXX China*, which is probably one of the best known styles of flat varnish brushes, is made of care-

fully selected black Chinese bristle, and since it is vulcanized in rubber can be used without danger of shedding in any vehicle that will not actually destroy the rubber. It is a brush thoroughly established by years of continued success.

Excellent sash or trim brushes of either flat or oval style, as desired, are offered in the *Master Painter* and *Tycoon* sash. Both are vulcanized in rubber, and the latter, which is oval, is made with a special seamless tubular steel ferrule which will not split.

While unquestionably the use of Chinese bristle in paint or varnish brushes has been completely justified, however, require bristle of a heavier texture and



Oval Varnish Brush Construction

To the left is sectional view of a solid Oval Varnish Brush with plan of block in larger scale, showing separating pegs. In the center is an open center Oval Varnish Brush, and, at right, a sectional view showing its construction.



Preferred by Those Who Know Good Varnish Brushes

The *XXX China* and *Apollo* Flat Varnish Brushes; the *Master Painter* Flat Sash or Trim; the *Winner Black* and *Tycoon* Oval Sash Brushes.

larger flag to maintain the necessary elasticity and carry the required amount of calcimine.

For many years there has existed a marked preference for white or yellow bristle in such brushes, and as the difference in cost between white, or yellow, and gray Russian bristle was small, many flat calcimine brushes were made entirely of white bristle, or yellow cased with white.

With the shortage of Russian bristle, developed during the war, and a greater demand for the yellow and white bristle for other purposes, the difference in cost between the white and yellow, and the gray became so great that we do not believe the best interests of the calciminer are served by making these brushes of either all white or white and yellow stock.

Obtained from the same kind of swine, the several colors of Russian bristle are similar in texture

and elasticity; no color has advantages for calcimine brushes which the others have not. We, therefore, with the belief that we are providing the most efficient brushes, and brushes that still

make for economy of the user, recommend to the calciminer our *Superfine* and *Master Painter*, both brushes made of gray bristle with a heavy yellow casing, and both made of the very finest qualities of bristle that are to be obtained.

No painter's kit is complete without a suitable duster. The *No. 26 Stranglehold* provides an inexpensive, thoroughly practical duster which is guaranteed not to shed. Its construction is that used in our Dutch calcimine brush.

Calcimine brushes of the so-called "Dutch" types are almost exclusively used in the Western part of this country.

With a thorough knowledge of the needs of the trade and the serv-



*No. 26 Stranglehold
Painter's Duster*

The Guarantee: "If it sheds a knot within six months, we will give you another brush."

MERCHANDISING BRUSHES

ice expected of such a brush, after much experimenting we introduced the *Stranglehold* family of calcimine brushes.

These brushes carry more stock than can be put into the same size brush of other construction.



(A) The *Super-fine* Flat Calcimine Brush, a great favorite with users of the flat style.

(B) *Stranglehold* Calcimine. This is a development of the Pittsburgh Plate Glass Co. Insert shows the method of construction.



Types of Calcimine Brushes

The bristle is vulcanized into a solid rubber block which, of course unaffected by water, will not warp or split.

The bristle is set in knots for the well-known advantages of this style of setting. Because of its compactness this brush will wear much closer to the block than any other calcimine brush without becoming stubby.

If it sheds a knot in six months we will give you another brush. It is more costly than other Dutch types, but it is by far the most economical brush made. It is manufactured in various sizes and lengths of bristles.

The construction of these brushes is clearly shown in the illustration.

To those calciminers who prefer a Dutch brush with the bristle set in rows instead of knots, we offer our latest development, the *Amsterdam*. In

this brush, as in the *Stranglehold*, only Russian bristle of the highest quality is used. The bristle is vulcanized in rubber. The brush, bound with a protective steel ferrule, is designed to combine compactness, strength, and comfortable balance with the greater calcimine capacity; it also is made in various sizes and lengths.

With the growth of the motor-car industry has come a steadily increasing demand for dependable brushes for automobile painting.

This Division maintains a soft hair brush factory which meets every possible need of the most exacting—in color, flowing, striping, and all the other special brushes of the soft hair trade.

In this plant every sort of soft hair brush for the artist, the signwriter, and the letterer is made in a distinctly American way; it produces brushes to satisfy the most critical.

With the introduction by the paint and varnish manufacturer of many specialties for household and non-professional use, there has followed a corresponding demand for brushes to apply these finishes.

Unfortunately too little consideration has been given to

(c) The new *Amsterdam* Continuous Row, Dutch Calcimine Brush.



these tools for the amateur, too little consideration to the thought: "*The brush—as important as the paint or varnish.*"

Good paint cannot be applied successfully with poor brushes. Every dealer should realize this and so instruct his clerks that suitable

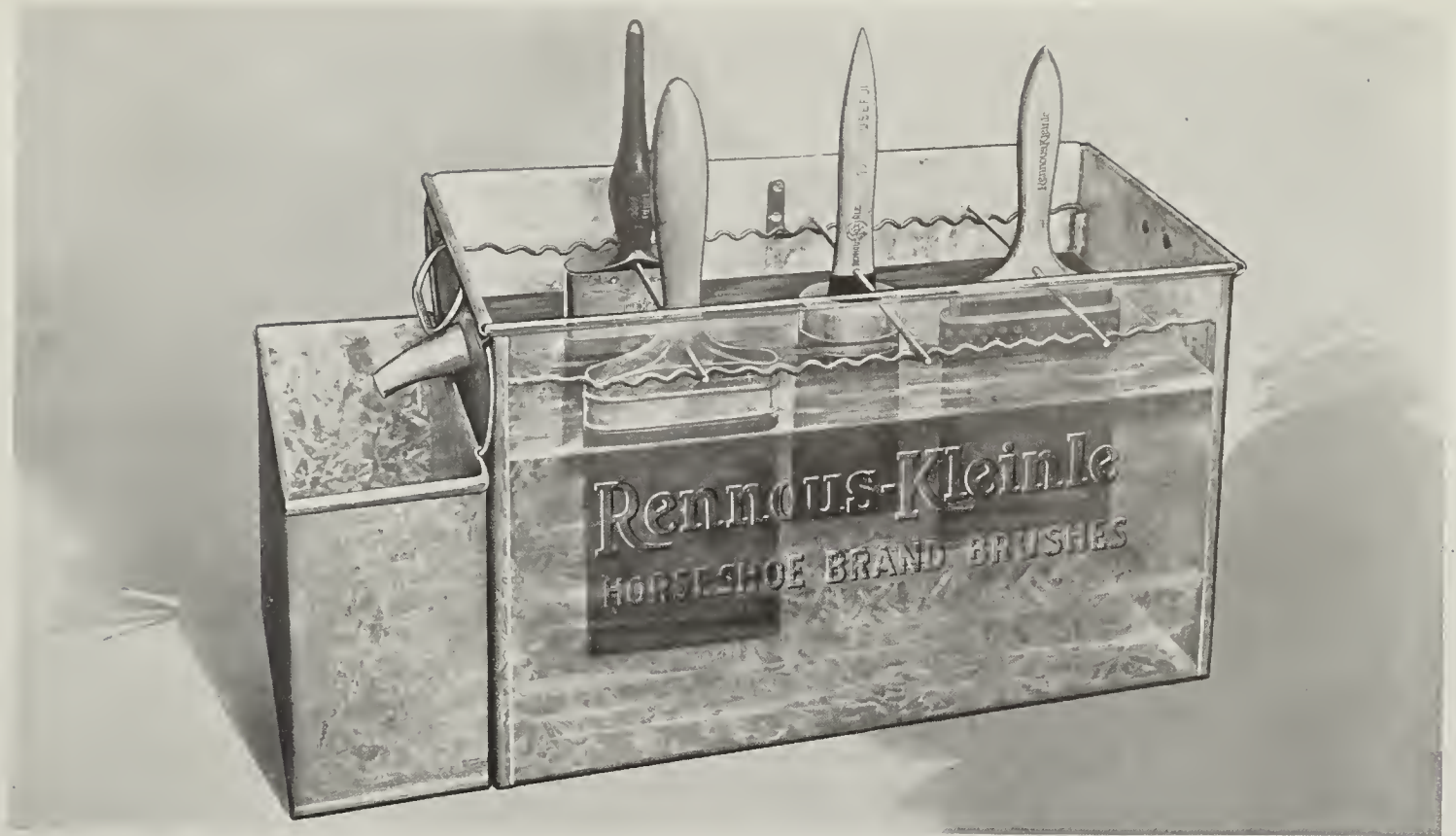
PITTSBURGH PLATE GLASS COMPANY



Horseshoe Brand Brushes are Packed for Protection

Nearly all bristle brushes are individually wrapped, the wrappers of the small brushes fastened with rubber bands, the larger ones are tied with string. The brushes are then packed in boxes of convenient size. Soft hair brushes are packed in papers of one-half dozen brushes, two papers in a box. The boxes are distinctively labeled in two colors; these boxes are then packed in strong wooden cases, which are bound with metal strips, locked, and sealed for shipment.

MERCHANDISING BRUSHES



The Rennous-Kleinle Brush Keeper

Not only does this keeper give ample protection to the brushes, but keeps the bristle straight and the oil at a constant level at all times.

brushes will be sold with every paint and varnish product.

We do not believe it necessary for the average paint dealer to carry a line of great variety; on the contrary, we suggest a small line of brushes carefully selected to meet his trade requirements. This class of trade being less likely to exercise proper care of brushes when not in use, we recommend the vulcanized in rubber lines here illustrated.

As manufacturers of thousands of kinds of brushes we are able to meet every requirement for the application of paint or varnish in whatsoever field of industry or art they are used.

Complete stocks of the most frequently used brushes are to be found in our many Warehouses. All inquiries covering special requirements directed to any of these Warehouses will be answered promptly through the proper channel.

No treatise on brushes would be complete without reference to their care, both while in stock and after they have been put into use.

Improvement in the setting material used makes brushes nowadays less liable to damage than formerly, but reasonable care should be ex-

ercised to prevent their drying out and being damaged by moths.

The best damage preventive is a frequent stock turnover.

A carefully selected short line of brushes purchased under our plan of merchandising will insure better brushes to the consumer, at better prices, and at a far greater profit to the dealer than ever was possible under the old method. Our system of displaying stock can be followed with profit by every brush dealer. Let us tell you about it at your convenience.

It has been said that more brushes are destroyed by improper care after being put into service than ever are worn out. The statement carries much truth. Strange to say, painters themselves are great offenders and do not give their brushes the care their cost and good workmanship demand.

Never put paint or varnish brushes into water, either before or after they are put into service; water makes bristle soft and moppy; it spoils the best of brushes.

Oval brushes can be tightened by pouring a little water on the butt end of the handle, in the

center of the brush, allowing it to be absorbed by the butts of the bristle; but the brush should never be submerged. We illustrate on the preceding page a brush keeper which insures perfect protection for the brushes and which maintains the proper level of oil at all times.

After service, suspend your brushes in raw linseed oil, free of the bottom of the container, deep enough to allow the oil to reach above the bottom of the band or strap.

Varnish brushes should be kept in a separate container and thoroughly washed out in some paint solvent, such as turpentine or Leptyne, before being put into varnish again.

Thoroughly wash out your calcimine and whitewash brushes and hang them, bristles downward, to dry after use.

Never put a damp brush into work; you will find it lifeless.

Flowing brushes should be suspended free from the bottom in varnish, color brushes in turpentine, in a dust proof container.

Lettering and striping brushes are best kept by cleaning them and flattening them out in non-drying oil on a piece of glass.

Naphthaline is the best moth preventive and should be used freely on all brushes kept in stock, with the single exception of pitch-set brushes—naphthaline will destroy pitch.

All Rennous-Kleinle brushes are made with the purpose for which they are to be used definitely in mind. They are finished to present the best sales appeal, and are sturdily and attractively boxed, as high class merchandise should be.



Soft Hair Brushes

Miscellaneous soft hair brushes of Pittsburgh Plate Glass Co. manufacture. These brushes are all favorites in their field.

LIST OF BRUSHES WITH SPECIFICATIONS

PARTIAL LIST OF HORSESHOE BRAND BRUSHES WITH SPECIFICATIONS

LEATHER BOUND OR STUCCO TYPE FLAT PAINT BRUSHES

All Leather Bound Flat Paint brushes are made of pure black Chinese bristle. No adulterations will be found in them. They are set with cement, bound with black leather on natural varnished handles, and striped with black. Six brushes are packed in a box.

Width.....inches	3	3½	4	4½	5
Length Clear.....inches					
Extra Black Stucco.....	4¼	4½	4¾	5	5
Master Painter Stucco.....	4¼	4½	4¾	4¾	4¾
Tycoon Stucco.....	3¾	4½	4¾	4¾	...
Duchess Stucco.....	3¾	4¾	4½	4½	...

METAL BOUND FLAT PAINT BRUSHES

Metal Bound Flat Paint brushes are made of pure black Chinese bristle, vulcanized in rubber, and equipped with natural varnished handles. Six brushes are packed in a box.

Width.....inches	2½	3	3½	4	4½	5	6
Length Clear.....inches							
Best Black.....	4¼	4¾	4¾	4¾	4¾	4¾	...
Master Painter.....	3¾	4	4¼	4½	4¾	4¾	...
Arkay.....	3¾	3¾	3½	3¾	4	4¼	...
Black Filler.....	2¾	2¾	2¾	3¼	3¾	3½	...
Leader.....	2¼	2¼	2¾	3	3¼	3½	...
Crackerjack (cement set)	2¼	2¼	2¼	2½	2¾	2¾	...
Service.....	...	...	...	...	...	...	3¾
345 Steelbound (Stucco Type)	4¼	4½	4¾	5	5	...	...

OVAL VARNISH BRUSHES

USEFUL

Pure black Chinese bristle, open center, elastic and topky, cement set, nickel ferrule, bridled or unbridled, natural varnished beaver-tail handle, black stripe. Packed six in a box.

Size	6	7	8	9	10	12
Width.....inches	2¼	2¾	2¾	2¾	2¾	2¾
Length Clear.....inches	3¾	4½	4¾	4½	4¾	4¾

MIKADO

Similar in descriptive detail to the Useful, but a much smaller and lighter brush.

Size	1 0	2 0	3 0	4 0	5 0
Width.....inches	1 5/8	1 11/16	1 3/4	1 13/16	1 7/8
Length Clear.....inches	2 3/4	3	3 1/8	3 1/4	3 3/8
Size	6 0	7 0	8 0	9 0	10 0
Width.....inches	1 15/16	2	2 1/16	2 1/8	2 3/16
Length Clear.....inches	3 1/2	3 3/8	3 3/4	3 7/8	3 7/8

CHESAPEAKE

An excellent brush of the flat oval type, pure black Chinese bristle, solid, vulcanized in rubber, nickel ferrule, natural varnished flat oval handle, striped black. Packed six in a box.

Size	1	2	3
Width.....inches	2¼	2¾	2¾
Length Clear.....inches	3 1/8	3 3/8	3 7/8

TRUMPS

Identical in detail with the Chesapeake, except smaller dimensions. Packed six in a box.

Size.....	Spades	Clubs	Diamonds	Hearts
Width.....inches	1 9/16	1 11/16	1 13/16	2 1/8
Length Clear.....inches	2¼	2½	2¾	3

FLAT VARNISH BRUSHES

The following Flat Varnish brushes are made of pure black Chinese bristle, chiseled, and vulcanized in rubber. They have nickeled ferrules and natural varnished handles, and are packed twelve in a box. In the three-inch and larger sizes the Arcadia and Spar are packed six in a box. The Black Bird and Fan Tan are cement set, tin bound, and have plain unvarnished handles.

Width.....inches	1	1½	2	2½	3	3½	4
Length Clear.....inches							
Arcadia.....	...	2¼	2½	2¾	3	3½	...
Apollo.....	...	2¾	2¾	3½	3¾	3¾	3¾
XXX China.....	...	2¾	2¾	2¾	3½	3½	3½
Spar.....	...	2¼	2¼	2¾	2¾	...	...
Chang.....	1 7/8	2	2¼	2½	2¾	...	...
Four-Fifty.....	1¾	1¾	2¼	2¼	2¼	...	...
Black Bird.....	1 5/8	1 5/8	1 7/8	2	2¼	...	...
Fan Tan.....	1¾	1½	1 5/8	1 5/8	1 5/8	...	...

SASH BRUSHES

TYCOON (OVAL)

Pure black Chinese bristle, chiseled, vulcanized in rubber, seamless oval nickel ferrule, natural varnished handle. Packed twelve in a box.

Size	2	3	4	5	6
Width.....inches	1 11/16	3/4	1 3/16	1 5/16	1
Length Clear.....inches	1 1/2	1 5/8	1 3/4	1 7/8	1 15/16
Size	7	8	9	10	12
Width.....inches	1 1/16	1 1/8	1 1/4	1 5/16	1 1/2
Length Clear.....inches	2	2 1/8	2 1/4	2 3/8	2 3/4

MASTER PAINTER (FLAT)

Pure black Chinese bristle, double thick, chiseled, vulcanized in rubber, nickel bound, natural varnished long half-round handle. Packed twelve in a box.

Width.....inches	1	1½	2	2½
Length Clear.....inches	2	2 1/8	2 3/8	2 1/2

DUTCH CALCIMINE BRUSHES

STRANGLEHOLD

Gray Russian bristle of finest quality, vulcanized in a solid hard-rubber block, natural varnished block and handle. Packed one in a box.

Size.....	1-S	3-S	5-S
Dimensions.....inches	7 3/8 x 2 3/16	7 3/8 x 2 3/16	7 3/8 x 2 3/16
Length Clear.....inches	4 1/4	4 1/2	5

CONTINUOUS ROW CALCIMINE BRUSHES

A new type of Dutch Calcimine construction described and illustrated on page 149. These brushes are made of gray Russian bristle.

Size	10	20	30	40	50	Block
Length Clear.....inches						
Appingedam.....	...	...	4½	4¾	5	2¾ x 7 1/4
Vreendam.....	4	4¼	4½	4¾	5	1¾ x 7 1/4
Amsterdam.....	...	...	4½	4¾	5	2¾ x 7 1/4
Rotterdam.....	4	4¼	4½	4¾	5	2¾ x 7 1/4
Vandam.....	4	4¼	4½	4¾	5	1¾ x 7 1/4

PITTSBURGH PLATE GLASS COMPANY

PARTIAL LIST OF HORSESHOE BRAND BRUSHES WITH SPECIFICATIONS—Continued

FLAT CALCIMINE BRUSHES

SUPERFINE

Pure yellow Russian bristle casing, middle of pure gray Russian bristle, vulcanized in rubber, bound with galvanized iron, unvarnished poplar handle. Packed three in a box.

Width.....inches	7	8
Length Clear.....inches	5½	5¾

MASTER PAINTER

Pure yellow Russian bristle casing, middle of pure gray Russian bristle, similar to but of lighter weight than the Superfine.

Width.....inches	7	8
Length Clear.....inches	5¼	5½

BOSS

Similar to but lighter than the Master Painter.

Width.....inches	7	8
Length Clear.....inches	5	5¼

NICKEL PLATE

Pure black Chinese bristle, stiff and heavy, vulcanized in rubber, nickel bound, natural varnished handle. Packed three in a box.

Width.....inches	6	7	8
Length Clear.....inches	4¾	4¾	4½

BULL DOG

Pure yellow Russian bristle, vulcanized in rubber, nickel bound, natural varnished handle. Packed six in a box.

Width.....inches	6	7	8
Length Clear.....inches	4	4¼	4½

MIKADO

Pure black Chinese bristle, cement set, nickel bound, natural varnished handle. Packed six in a box.

Width.....inches	6	7	8
Length Clear.....inches	3¾	4	4¼

BUSTER

Pure black Chinese bristle casing, middle of black Chinese bristle and horsehair, cement set, nickel bound, natural varnished handle. Packed six in a box.

Width.....inches	6	7	8	9
Length Clear.....inches	3¼	3½	3¾	4

WHITEWASH BRUSHES

MIKADO

Pure black Chinese bristle, extra row of bristle set in center, cement set, nickel bound, natural varnished block, black stripe. Packed six in a box.

Width.....inches	6	7	8
Length Clear.....inches	3¼	3½	3¾

NICKEL PLATE

Similar in detail to the Mikado.

Width.....inches	6	7	8	9
Length Clear.....inches	2½	2¾	3	3½

BLACK DIAMOND

Pure black Chinese bristle casing, middle of Chinese bristle and horsehair, cement set, nickel bound, natural varnished block. Packed six in a box.

Width.....inches	6	7	8
Length Clear.....inches	2¼	2½	2¾

FLAT PAINTER-DUSTERS

26 STRANGLEHOLD

Pure black Chinese bristle casing, middle mixture of black Chinese bristle, horsehair and fiber, vulcanized in rubber, natural varnished handle. Packed six in a box.

Size	26	Width...in.	4¼	Length Clear..in.	4¼
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ROUND PAINTER-DUSTERS

50 STRANGLEHOLD

Pure white French bristle casing, middle of pure yellow Russian bristle, vulcanized in rubber, natural varnished handle. Packed six in a box.

Size	50	Diameter..in.	2½	Length Clear...in.	4
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ROYAL COACH

Pure white Russian bristle casing, middle pure white French bristle, pitch set, natural varnished handle. Packed six in a box.

Size	10	Diameter..in.	2¾	Length Clear...in.	4
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WINNER

Pure black Chinese bristle casing, middle mixture of black Chinese bristle, horsehair and fiber, other details identical with the Royal Coach.

Size	2	Diameter..in.	2¾	Length Clear..in.	3¾
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The brushes listed above are a partial list of the standardized Horseshoe Brand line, manufactured and distributed by the Pittsburgh Plate Glass Company. A complete catalogue can be obtained from the nearest warehouse.

PAINTERS, PAPERHANGERS, AND GLAZIERS
TOOLS, EQUIPMENT, AND SUPPLIES



A Row of Dry-Color Tubs in the Milwaukee Factory



PAINTERS, PAPERHANGERS, AND GLAZIERS TOOLS, EQUIPMENT, AND SUPPLIES

FIFTY years ago, even twenty-five years ago, the tools used by mechanics in every craft were comparatively simple in design and construction and limited in variety. It was not uncommon in those days to find the exacting workman fashioning his own instruments in order that he might perform his work with greater ease and skill.

Yankee inventive genius has ever sought to devise ways and means for the elimination of unnecessary motions and for lightening labor. Enterprising manufacturers quickly embraced the opportunities offered in the production of tools to meet the requirements of the artist and the mechanic.

Thus, where formerly but one shape of instrument was manufactured for the performance of a certain piece of work, today many and varied shapes of that type are available, and the mechanic may select from the numerous offerings such tools as suit his particular need or fancy.

The average workman is very critical in the appraisal of a tool: the material must be

of good quality and it must be of a design which he feels will enable him to perform his work with speed and satisfaction.

Many improvements in tools and appliances used by the painter, paperhanger, and glazier have been advanced by the workmen in those lines, and have been adopted as soon as their practicability was established. For example, the original measuring rule was made of one piece of seasoned wood, and later reinforced with brass bindings and edges; today, rules are built in laminated construction, inset in brass, and are practically impervious to atmospheric influence, retaining their alignment indefinitely. Valuable cutting and trimming devices have been developed, reducing labor and increasing precision. Devices which make for safety and convenience are constantly being perfected.

The illustrations in the following pages represent the latest productions in tools, appliances, and supplies used by the painter, paperhanger, and glazier.



SUNDRIES

RECOGNIZING the importance of Sundry items to the success of painting operations, provision has been made to supply the trade through our distributing Warehouses with a select line of Calcimines, Cold Water Paints, Dry Colors, Shellacs, Glues, Sandpaper, and other Abrasives: Steel Wool, Sponges, Bronzes, and other paint sundries.

Advantage has been taken of many years' experience to eliminate unnecessary or duplicating items, while retaining all the essentials, so that we are able to present on the following pages a compact list of miscellaneous articles used and sold in connection with Paints, Varnishes, Enamels, Stains, and other finishing materials.

SUNDRIES

CALCIMINES AND COLD WATER PAINTS

KALKOMO WALL FINISH

Kalkomo is the ideal calcimine for the decoration of interiors. It gives that soft, velvety, water-color effect so essential to refined surroundings and can be applied on plaster walls, wood, or wallboard.



Kalkomo is scientifically prepared from the finest washed and floated whiting, and the very best hide-stock glue. It is instantly soluble in cold water. One pound of Kalkomo when properly mixed will cover from 60 to 120 square feet, according to the surface.

Kalkomo is made in white, attractive tints, and rich deep colors, all of which are intermixable, so that any desired shade may be produced.



It is adaptable to the individual decorative requirements of any class of building.

5-pound packages (20 packages to the case)
100-pound drums or kegs
350-pound barrels

KALKOMO FRESCO COLORS

(Dry Sized)

To be mixed with cold water for deep or solid color effect, or for tinting White Kalkomo Wall Finish or intermixing to produce other tints.

Kalkomo Fresco Colors are prepared in dry powder form, with the right amount of size or binding material. Non-poisonous.

2½-pound packages	50-pound boxes
5-pound packages	100-pound kegs
25-pound boxes	350-pound barrels



MILL WHITE

Soluble in cold water. Especially adapted to finishing interiors of factories, mills, warehouses where the clean, sanitary, and improved light-reflecting effect is desired without the use of an oil paint (see Alba-Lux, page 60).

Six pounds properly mixed with cold water makes one gallon of paint for application with brush or spraying machine. One pound covers from 40 to 60 square feet, depending upon surface conditions.

50-pound drums
100-pound kegs
400-pound barrels

GRANITITE COLD WATER PAINT

In white and tints, for exterior and interior use: warehouses, factories, fences, docks, walls in areaways, light shafts. Dry powder for mixing in cold water, two parts of Granitite to one part water. One pound covers from 40 to 75 square feet, depending upon surface. Strongly adhesive, for application with brush or spraying machine. Washable, will not rub, peel, or flake off, weather-proof and fire-retarding.

25, 50, and 100-pound drums or kegs
400-pound barrels

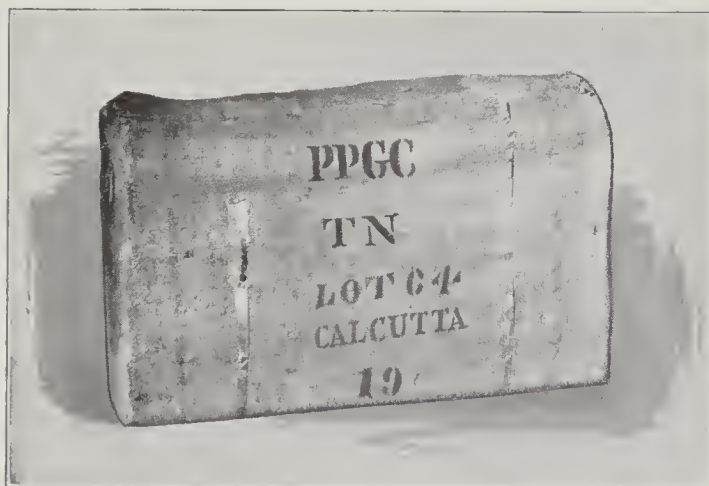
DRY SHELLAC AND SHELLAC VARNISHES

SHELLAC

Shellac or lac is a product of the East Indies, obtained especially from Bengal, Siam, and Assam. It is of interest that the crude shellac is the product of countless insects, which fasten themselves upon the trees that yield the sap on which they live. These minute insects exude a secretion resulting from the absorption of the sap, which gradually covers their entire body.

Thus a hard resinous substance is formed on the branches of the trees by myriads of these parasites. The twigs are gathered with their living inhabitants in June and November. The secretion is known in commerce as "stick lac." It is melted, strained, and spread out in thin layers and comes to us as shellac in flake form. Shellac varies in color from a dark amber to an almost pure black.

Shellac has many uses. It is an important factor in the making of phonograph records, shoe polish, felt hats, special cements, and insulating varnishes. When dissolved in alcohol, shellac is most widely used as a first coater before the application of varnish or wax, particularly when rapid drying is a requisite, and for sealing knots before painting. It dries quickly to a hard, brittle, and glossy surface. Shellac does not possess the qualities required for a final or finishing varnish, and because of its brittleness is not suitable for use on floors or other surfaces exposed to hard wear.



The different grades and kinds of the orange shellac gum are known to the trade by "marks." To insure the receipt of shellac of uniform quality and of the grade or kind for the purpose intended, the "marks" should be specified when ordering.

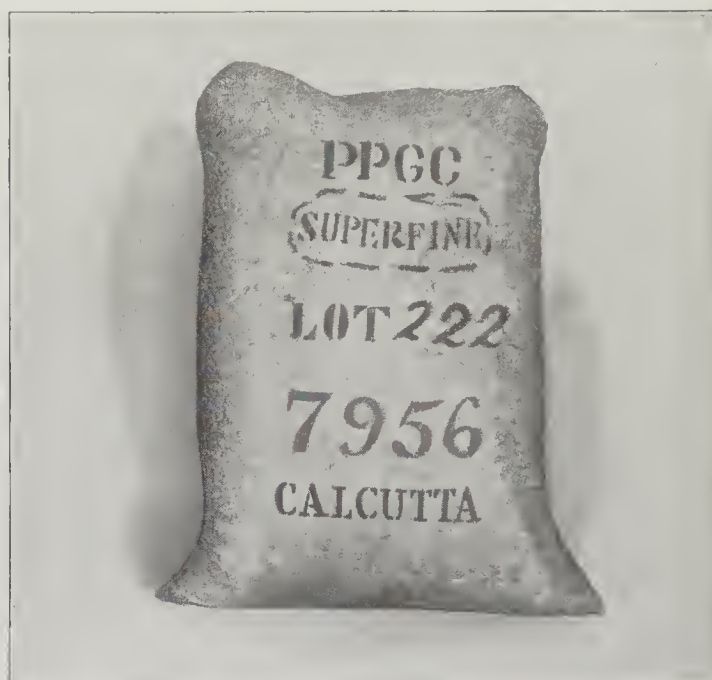
U. S. Standard T. N.	V. S. O.
Pure T. N.	D. C.
Superfine	Diamond 1
A. C. Garnet	

In the original import packages of 164 pounds each, and in smaller quantities as desired.

The T. N. and Superfine are the grades generally used in connection with painting and varnishing; the V. S. O. and D. C. for special finish such as mirror back paint and for pattern-makers' use.

White shellac is the result of bleaching the orange gum; in barrels of about 400 pounds, and in smaller quantities as desired.

Bone Dry Bleached
Also for special trade:
Fresh Ground
Hanks



SHELLAC VARNISHES

Orange and White

Gum Shellac is dissolved or cut in denatured alcohol—four to four and one-half pounds gum to the gallon for general finishing and five pounds for heavy-bodied shellac for pattern-makers and special purposes.

Gum Shellac prepared in this way is known as Shellac Varnish and sometimes is called Spirit Varnish. Shellac Varnish may be thinned with 188 proof denatured alcohol.

Supplied in two grades:

Pure Denatured Alcohol, Orange
Pure Denatured Alcohol, White
Denatured Alcohol Orange Compound
Denatured Alcohol White Compound

1½-pint bottles	1½-gallon cans
1¼-pint bottles	1-gallon cans
1½-pint bottles	5-gallon cans
1-pint bottles	25-gallon 1½-barrels
1-quart bottles	50-gallon barrels

SAND, EMERY, AND GARNET PAPER—OTHER ABRASIVES

SANDPAPER

The general term "Sandpaper" means a fabric of paper or cloth, or a combination of both, on which a crushed and graded abrasive is firmly glued. Each variety of sandpaper is assigned a trade name, usually the name of the abrasive with which it is coated. Thus paper coated with flint is known as flint paper; cloth covered with emery is known as emery cloth, etc. The abrasive or sand used in coating consists of natural or artificial crystals, crushed, cleaned, and graded. The first abrasive paper ever used to any extent commercially was coated with ground glass. The substitution of ground flint for ground glass proved so superior that it rapidly superseded glass paper. Flint crystal rock, from which flint paper, otherwise known as sandpaper, is made, is a natural mineral; largely silica, with a small percentage of lime, oxide of iron, water, and carbon, and when crushed into small grains it resembles ground glass.

As the flint crystal rock is cleaned and crushed by machinery, it is put through sifting machines and successively sifts through various screens, each screen selecting a certain size grit and discarding the other sizes. Re-grading machines take the selected grits and again pick out the exact size, the finer grits being sifted through silk screens. In this manner the grains are prepared for the machine which applies them to the paper or cloth backing. Only tough-fibered paper is used. It varies in weight to correspond with the size of the grain with which it is to be coated.



The grits are known by number: 000 (finest), 00, 0, $\frac{1}{2}$, $1\frac{1}{2}$, 2, $2\frac{1}{2}$, 3 (coarsest).

The raw paper, while in course of manufacture, is imprinted with the brand, grit number, etc., and is reeled from the machine in large rolls and stored until properly seasoned, after which it is taken to the sandpaper-making machine, where a coat of the best hide stock glue at the proper consistency is applied; the abrasive grains are then accurately fed and spread over the glued surface of the paper, which then passes

on in festoons to traveling hangers, and when partially dried reaches the sizing machine, by which a second coat of glue is applied, the paper continuing to travel on the hangers through the drying room, after which it is wound into large rolls, seasoned, and, finally, reaches the cutting room.

For hand work or ream goods, Gibraltar brand, first quality, are cut into sheets 9 x 11 inches, and the Giant brand, $8\frac{3}{4}$ x $10\frac{1}{2}$ inches; tied into quires of 24 sheets and assembled in packages of 10 quires; two of the 10-quire packages make one ream of 480 sheets. The Giant brand differs from the Gibraltar in the backing, glue, and size, the grit being the same.

Roll goods, although of the same grading as reams, are made on much heavier backing and with a heavier coating of glue and abrasives. This product is mainly used on sanding machines, and is manufactured in various widths, packed in 50-yard rolls.

EMERY AND GARNET PAPER

Garnet paper coated with crushed and graded garnet crystals is superior to flint for use on hard woods. Garnet is mined in the same manner as flint, the best source of supply being in the Adirondack mountains.

Emery is a natural ore and has been used for many years in the polishing of metals. Our emery cloth and paper are coated with the best grade of genuine Turkish emery.

OTHER ABRASIVES

Abrasive cloth (artificial emery), which is especially adapted to heavy finishing work on tough and hard metals, possessing unusual endurance and cool-cutting qualities, is made from Bauxite clay, found in Austria and Georgia, is converted by electrical furnaces into aluminum oxide, and is generally known as an abrasive with an aluminum base.

Carbonite cloth (artificial emery) is recommended for use on soft cast metals of short fiber. It possesses a very hard, sharp edge, and is a rapid cutter. The grain is made from salt, sand, coke, and sawdust, properly fused in an electric furnace, becoming carbide of silica.

Cloth, such as garnet, flint, emery, crocus, abrasite, and carbonite, is manufactured by the same process as flint paper, and is supplied in either reams 9 x 11 inches or rolls of various widths in 50-yard length. The cloth used as a backing for our abrasive is a strong, flexible, woven cotton fabric known in the trade as "drills."

Finishing papers are made on thin paper with a light, smooth coating, and are furnished in both single and double-face; garnet or flint, reams or rolls. The double-face is coated on both sides of a two-ply paper so made that the plies can be easily separated to give two sheets each on a lighter backing than could be used for "single-face." Four hundred and eighty sheets to a ream of single-face and two hundred and forty sheets to a ream of double-face paper.

STEEL WOOL, PUMICE STONE, GLUES, FELT

STEEL WOOL

Used instead of sandpaper and other abrasives in preparing surfaces for finishing. For removing, in connection with paint and varnish remover, old coats of paint, enamel, and varnish before refinishing. Steel Wool cuts quickly and uniformly, and because of its pliability is especially adapted for work on curved or uneven surfaces.



Steel Wool No. 00 corresponds to the grit of No. 000 sandpaper.

Steel Wool No. 0 corresponds to the grit of No. 00 sandpaper.

Steel Wool No. 1 corresponds to the grit of No. 0 sandpaper.

Steel Wool No. 2 corresponds to the grit of No. 1/2 and No. 1 sandpaper.

Steel Wool No. 3 is for work which would require No. 1 1/2 or No. 2 sandpaper.

One-pound rolls, paper packages, 25 packages to the carton.

Household Sizes

In three grades: No. 0 Fine, No. 1 Medium, No. 3 Coarse.

Large size—in cartons, 1 dozen in a carton.

Small size—in cartons, 1 dozen in a carton.

STEEL SHAVINGS

Coarser than Steel Wool, in two grades: Fine and Medium. 1-pound rolls, paper packages, 25 packages to the carton.

RUBBING FELT

Used with pumice stone for rubbing down varnish coats, and with rotten stone for polishing. Supplied in sheets of 1/4, 3/8, and 1/2-inch thicknesses; original sheets are 36 inches square. Sheets will be cut to supply demands for smaller sizes.

White, compressed hard

White, soft texture

PUMICE STONE

Pumice Stone is imported from Italy in lump, or ground. That which is imported in the lump and ground in this country, is known as American Ground Pumice, and is the most satisfactory because of its uniform fineness and freedom from grit and foreign materials. Used for water-rubbing varnished and enameled surfaces, and as an abrasive.

No. FFF.	Very Fine Powder
No. FF.	Extra Fine Powder
No. F.	Fine Powder
No. 00.	Fine Medium Powder
No. 0.	Medium Powder
No. 1/2.	Medium Coarse Powder
No. 1.	Coarse Powder

In bags, barrels, 100 and 50-pound drums, and in bulk as required; also selected Lump Pumice Stone.

ROTTEN STONE

For oil-rubbing and polishing varnished and enameled surfaces. Selected grade in very finely powdered form.

In 100 and 50-pound drums, and, in bulk, any quantity.

RUBBING STONE

For water-rubbing rough surfaces and for cleaning. In bricks of about 1 pound each. Soft and Medium Hard.

GLUES

Liquid Glue

Used for hanging burlap, for cabinet work, and for general household use.

Ounce bottle, 1 dozen in display box

Gill can, 1 dozen in display box

1/2-pint can, 2 dozen in case

Pint can, 1 dozen in case

Quart can, 1 dozen in case

1/2-gallon can, 1/2 dozen in case

Gallon can, 1/2 dozen in case

5-gallon can, boxed

DRY GLUES

In barrels; 100 and 50-pound drums, and in smaller quantities.

For Fresco Work

Clear Gelatine Glue, Thin Cut Clear Hide Glue.

For Calcimining

Thin Cut White Flake Glue, Extra White Ground Glue.

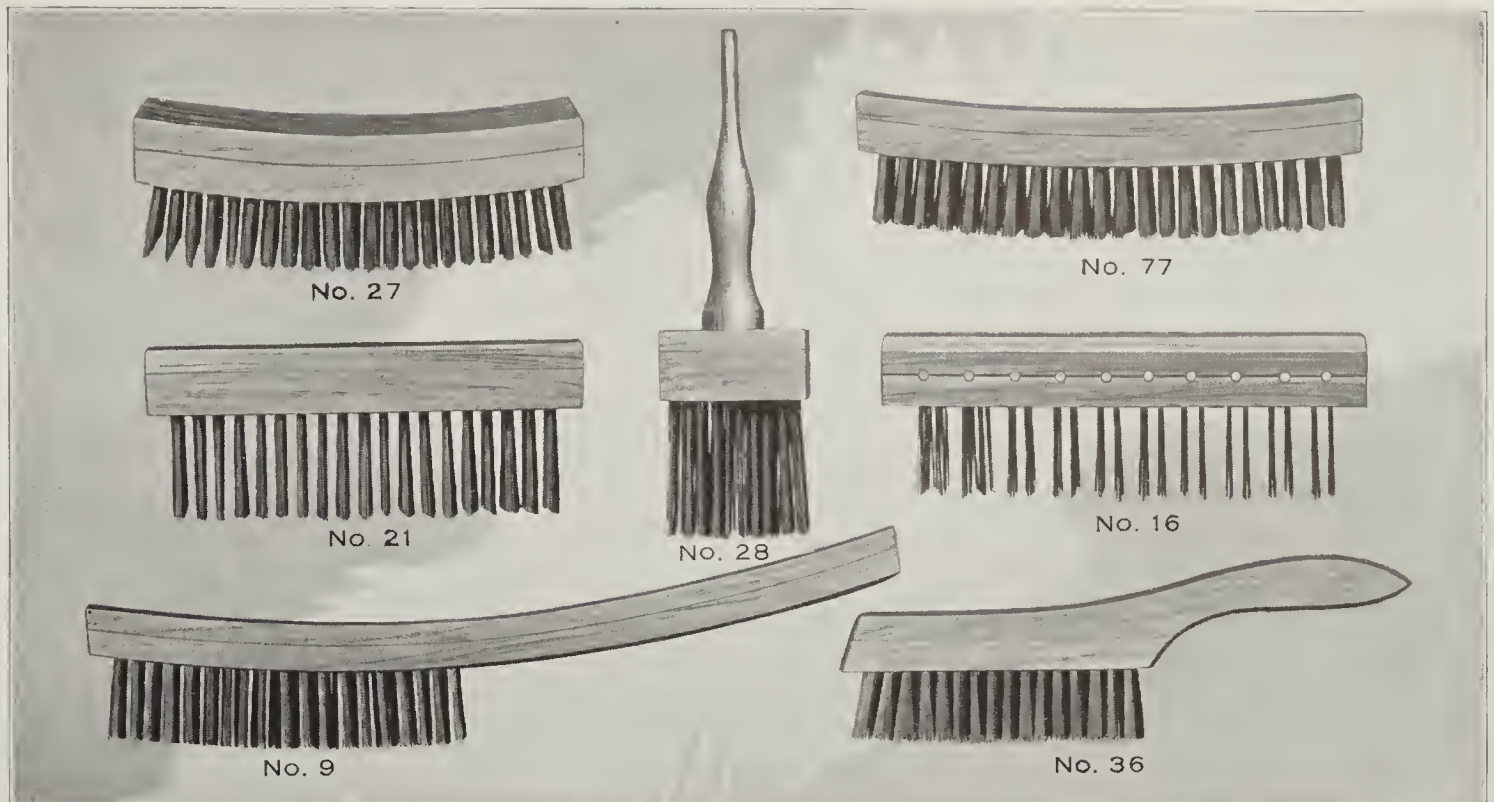
For Sizing

Light Amber Sizing Glue.

For Cabinet Work

Flake Cabinet Glue, Noodle Cabinet Glue, Ribbon Cabinet Glue, Sheet Cabinet Glue.

SUNDRIES



STEEL WIRE BRUSHES

These brushes are made of fine tempered Steel Wire in solid block. They are used for removing old paint, varnish, wax, or other finishes, and also in connection with Paint and Varnish Remover.

Steel Wire Brushes are also efficient in removing loose or scaling paint, cleaning radiators and other metal work, preparatory to painting or finishing.

Painter's Scrub—Curved Back, Round Wire

	Rows	Block	Length Wire
No. 27.....	7x21	2 $\frac{1}{4}$ x7	1 $\frac{1}{4}$ "
No. 77.....	9x21	2 $\frac{3}{4}$ x7	1 $\frac{1}{4}$ "

Painter's Scrub—Flat Back, Round Wire

	Rows	Block	Length Wire
No. 21.....	6x19	2 $\frac{1}{4}$ x7	1 $\frac{3}{4}$ "

Butcher's Block—Flat Wire

	Rows	Block	Length Wire
No. 16.....	5x10	2 $\frac{5}{8}$ x7 $\frac{1}{2}$	1 $\frac{1}{2}$ "

Painter's Duster—Round Wire

	Rows	Block	Length Wire
No. 28.....	6x10	1 $\frac{1}{8}$ x2 $\frac{3}{8}$	2 $\frac{1}{4}$ "

Bent Handle Scratch—Round Wire

	Rows	Brush part	Length over all	Length wire
No. 9.....	3x19	6 $\frac{1}{2}$ "	14"	1 $\frac{1}{4}$ "

Shoe Handle Scratch—Round Wire

	Rows	Brush part	Length over all	Length wire
No. 36.....	4x16	5"	9 $\frac{3}{4}$ "	1 $\frac{1}{4}$ "

Steel Wire Brush Assortments

These are put up in attractively packed boxes for counter, window, or show-case display.



This assortment contains:

2 Brushes	No. 77
4 "	No. 21
2 "	No. 28
4 "	No. 9
4 "	No. 36
2 "	No. 16

Total contents 1 $\frac{1}{2}$ Dozen

SPONGES

THE supply of Sponges for the American market is obtained principally from the West Coast of Florida, the waters about the Florida Keys and the Bahama Islands, where the sponge fishers use modern diving armor and apparatus for clipping sponges from their moorings on the sea bottom. The catch is taken ashore, where, after thorough washing, the sponges, the skeletons of what had been bodies with animal life, are strung in bunches and are then ready for market.

After selections, made by the buyers on the ground, of such grades as meet the requirements of our standards, the sponges are packed for shipment to a central point, where they are again washed and freed from shells, fragments of coral, and other foreign matter, sorted as to size and clipped to form.

Sponges in bales of either 25 or 50 pounds are sold by the pound and the sizes specified indicate the number of pieces to the pound, as:

1/2, 2/3, 3/4, 6/8, 8/10, 10/12, 12/16, 16/20, 20/30; 6/8, for instance, indicating that from 6 to 8 sponges weigh one pound. Sold in full bales, gross weight, 3 per cent allowance for tare is made; in smaller quantities, net weight as desired.

"Forms" are original shapes, "Cuts" result from cutting the Forms into two equal pieces. Forms are preferred for the smaller and medium sizes of the better grades of wool sponges. Cuts are more serviceable in those sponges which grow to large sizes, such as the Bahama or Nassau Wool, the Florida Yellow, and the Velvet sponges.

SHEEP'S WOOL SPONGES

Florida Rock Island. Best grade, firm soft texture, compact; have great water-holding properties; best for automobile washing. Florida Key Wool, Cuba Wool, Bahama or Nassau Wool.

FLORIDA YELLOW VELVET SPONGES

Not so smooth as wool sponges, with larger apertures, and less capacity for holding water.

GRASS SPONGES

An inexpensive sponge for rough work on walls and for use in general cleaning.

NEPTUNE BRAND SPONGES

(In Cartons)

Especially selected, packed in display cartons as illustrated, sold by the piece—the most satisfactory way to handle sponges for resale—thoroughly washed and cleaned, air-dried, and bleached in the sun. Ready for use.

Identification Number	Pure Wool Sponges, Forms	Number of Pieces in Carton
P. W. 25		25
P. W. 35		25
P. W. 50		25
P. W. 75		12
P. W. 100		6
P. W. 150		6
P. W. 175		6
P. W. 200		6
P. W. 250		6

Pure Wool Sponges, Cuts

P. W. C. 45	.....	25
P. W. C. 75	.....	25
P. W. C. 125	.....	25
P. W. C. 150	.....	12
P. W. C. 200	.....	12
P. W. C. 225	.....	6

Pure Velvet Sponges, Cuts

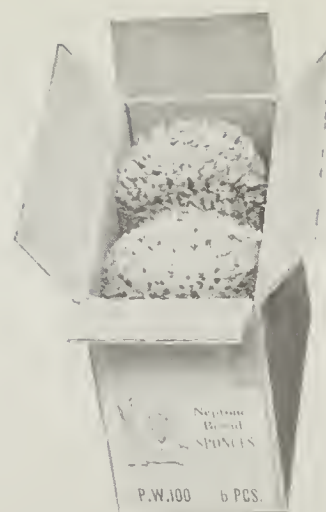
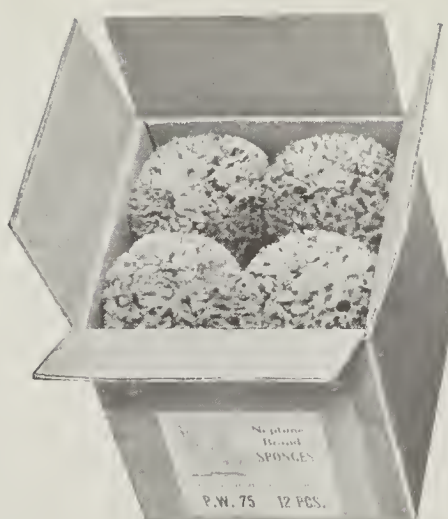
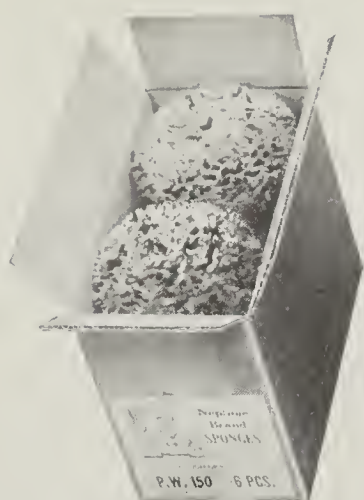
P. V. 25	.....	25
P. V. 50 a	.....	25
P. V. 50 b	.....	12
P. V. 75 a	.....	25
P. V. 75 b	.....	12
P. V. 75 c	.....	6
P. V. 100 a	.....	25
P. V. 100 b	.....	12
P. V. 100 c	.....	6

Pure Florida Yellow, Forms

P. Y. 10	.....	100
P. Y. 15	.....	100
P. Y. 25	.....	50
P. Y. 40	.....	50
P. Y. 60	.....	25
P. Y. 75	.....	25

The identification number is also the approximate retail selling price.

SUNDRIES

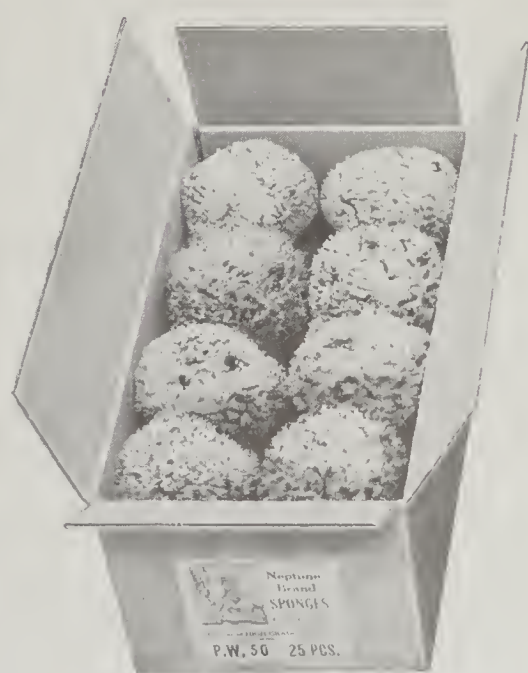
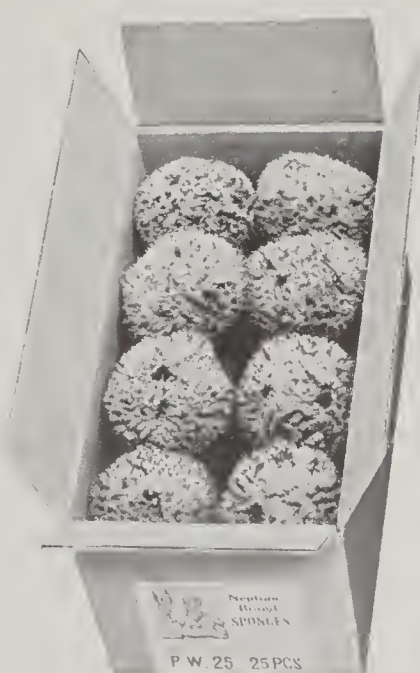
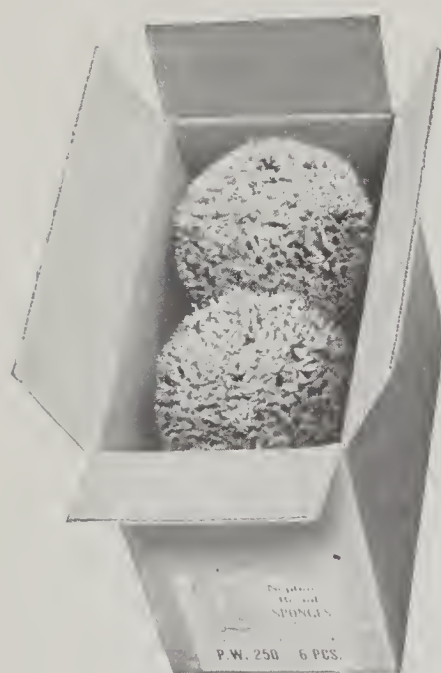
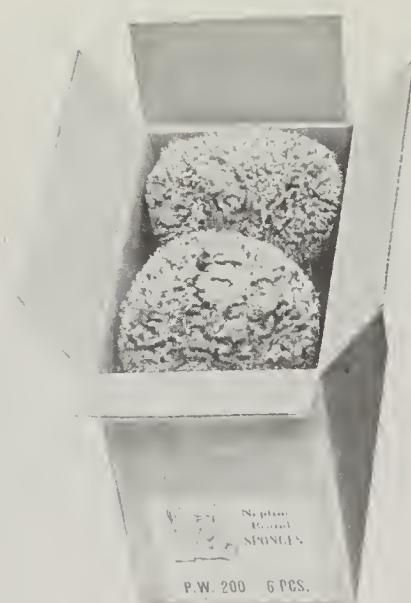
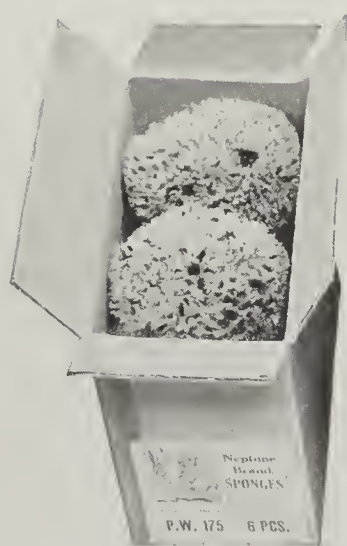


SPONGES

The method of packing Neptune Brand Sponges in cartons assures profitable handling of this commodity for the merchant and satisfaction to the customer.

Costs and retail prices are established on the value of the individual pieces.

Neptune Brand Sponges are thoroughly washed free from all foreign matter and bleached ready for use.





A Section in One of Our Dry Paint and Color Rooms

DRY PAINTS AND COLORS

WE are manufacturers of Dry Colors, producing chemically pure pigments in Reds, Yellows, and Greens. This insures uniformity of strength and color, and places us in a position to take care of the demand for this class of material.

We list herewith both chemically pure colors and dry paints, which are furnished in packages of all sizes and in any quantity.

LAMPBLACK

Lampblack is a deep black pigment consisting of pure carbon in a very fine state of division. Various grades are produced in the reduction of rosin pitch, oils, and fats.

The finest Lampblack is obtained in the combustion of oils and the better grades afford a pigment of great permanency and strength.

SUN-PROOF GERMANTOWN LAMPBLACK COMMERCIAL LAMPBLACK

Both grades packed for the trade in 1-pound, half-pound, $\frac{1}{4}$ -pound, and $\frac{1}{8}$ -pound packages, 50 pounds to the carton. Also in smaller quantities.

OTHER COMMERCIAL BLACKS

Drop Black
Bone Black

Graphite
Swedish Black

In barrels, drums, and smaller packages as required.

BLUES

P Brand
PP Brand
PPG Brand
PPGC Brand

Chinesc Blue
Cobalt Blue
K.K. Prussian Blue
Pure Prussian Blue

In barrels, 28-pound boxes, and smaller packages as required.

SUNDRIES

DRY PAINTS AND COLORS

BROWNS

American Umber, Raw
American Umber, Burnt
American Sienna, Raw
American Sienna, Burnt
Genuine Turkey Umber, Raw
Genuine Turkey Umber, Burnt
Genuine Italian Sienna, Raw
Genuine Italian Sienna, Burnt
Vandyke Brown
Spanish Brown
Bismarck Brown

GREENS

C.P. Chrome Green (Light, Medium, Dark)
K.K. Chrome Green (Light, Medium, Dark)
Alfalfa Green (Light, Medium, Dark)
Lime Proof Green (Light, Medium, Dark)

REDS

Indian Red
Turkey Red
English Rose, Lake
Navajo Red (Light, Dark)
Toluidine Red, D.S. 272
K.K. Vermilion, D.S. 8
Tuscan Red
English Rose, Pink
American Vermilion
Corona Red, D.S. 613
Gobbler Vermilion, D.S. 71
Genuine English Vermilion, Pale and Deep
Red Lead (Oxide)

YELLOWS

K.K. Chrome Yellow (Light, Medium, Dark)
C.P. Chrome Yellow (Light, Medium, Dark)
Corona Yolk Yellow (Light, Medium, Dark)
Litharge (Lead Oxide)
Orange Mineral (Lead Oxide)
Dutch Pink

OCHRES

American Ochre
Double Washed Ochre
Buff Ochre
French Imported Ochre
Golden Ochre (Chrome)

VENETIAN REDS

American Venetian Red
Venetian Red Oxide
English Venetian Red

Barrels (about 336 pounds), 50 to 100-pound drums,
and smaller packages as required.

WHITES

Silver White
White Ochre
Commercial Whiting Silica (Silex)
Dental Plaster
White Lead, Basic Carbonate
White Mineral Primer
Extra Gilders' Bolted Whiting
Plaster of Paris

ZINCS—DRY

Standard American Zinc
French Green Seal Zinc
French Red Seal Zinc

MINERAL PAINTS

French Gray Mineral
Prince's Metallie
Iron Mineral

MORTAR COLORS

Used for coloring mortar.

Buff
Dark Red
Chocolate Brown
Purple
Black

Furnished in bulk in any quantity. Put up in barrels, and 100 and 50-pound drums.

PARIS GREEN

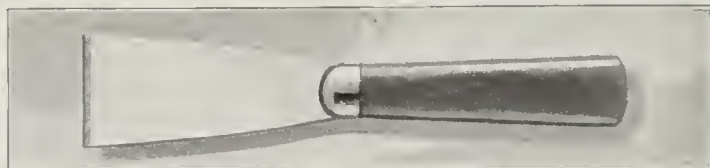
Strictly pure, in arsenic kegs, 100 to 175-pound kegs; 14, 28, and 56-pound kits, and in $1\frac{1}{4}$, $\frac{1}{2}$, and 5-pound boxes.

PITTSBURGH PLATE GLASS COMPANY

PUTTY AND SCRAPING KNIVES



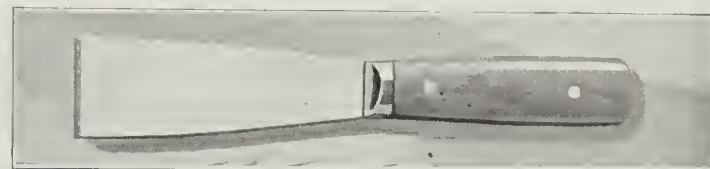
No. 100. Blade $3\frac{5}{8} \times 1\frac{5}{16}$ inches, rolled, tempered, polished, and cross polished; large natural beech handle, iron rivets. Stiff or elastic.



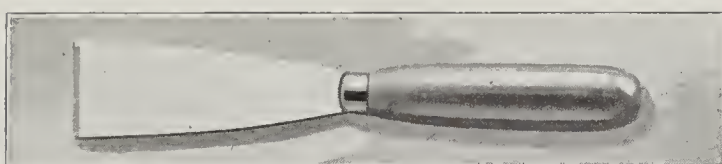
No. 107. Made exclusively for glaziers' use. Extra heavy stiff blades, only $4 \times 1\frac{3}{4}$ inches.



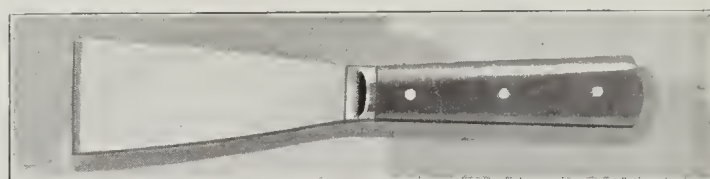
No. 101. Blade $3\frac{3}{4} \times 1\frac{1}{2}$ inches, rolled, tempered, polished, and cross polished; swelled polished walnut handle, brass rivets, medium lap metal bolster. Stiff or elastic.



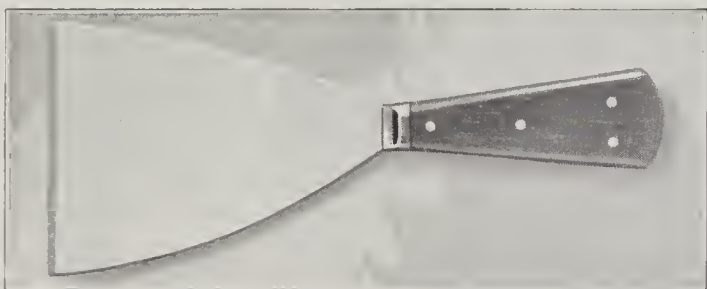
No. 108. Blade $3\frac{3}{4} \times 1\frac{3}{8}$ inches, tempered, polished; French walnut handle, metal ferrule. Stiff or elastic.



No. 102. Blade $3\frac{3}{4} \times 1\frac{1}{4}$ ins., tempered, straight, polished ferrule, burnt wood handle. Stiff or elastic.

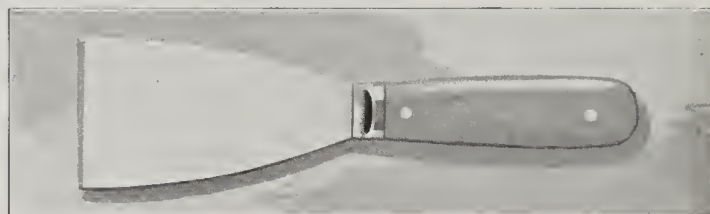


No. 109. Blade $3\frac{3}{4} \times 1\frac{1}{4}$ inches, rolled, tempered, polished, and cross polished; short lap metal bolster; swelled polished walnut handle, brass rivets. Stiff or elastic.

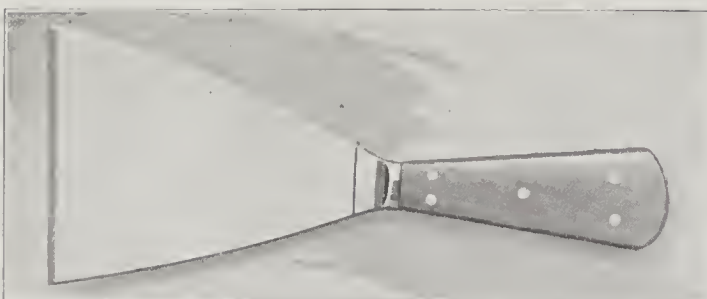


No. 103. Blade rolled, tempered, polished, and cross polished, width 3 inches; polished walnut handle, brass rivets, heavy metal bolster. Stiff or elastic. Square point only.

No. 104. Same, with $3\frac{1}{2}$ -inch blade.

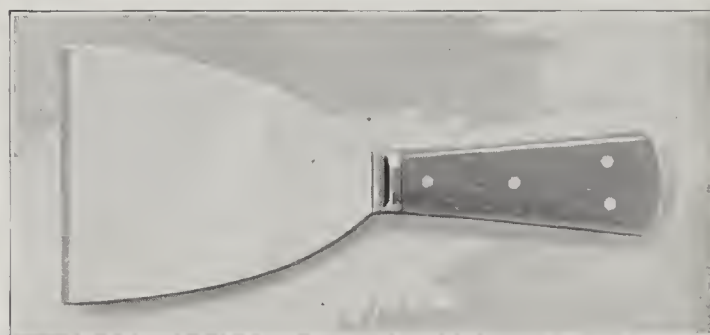


No. 110. Blade $3\frac{5}{8} \times 2$ inches, rolled, tempered, polished, and cross polished; swelled polished walnut handle with metal bolster, brass rivets. Stiff or elastic.



No. 105. Blade rolled, tempered, polished, and cross polished, 3 inches wide. Shell-ebony handle, brass rivets; heavy brass bolster, projecting $\frac{3}{8}$ inch over blade, protecting it from breaking or bending at tang.

No. 106. Same, with $3\frac{1}{2}$ -inch blade.

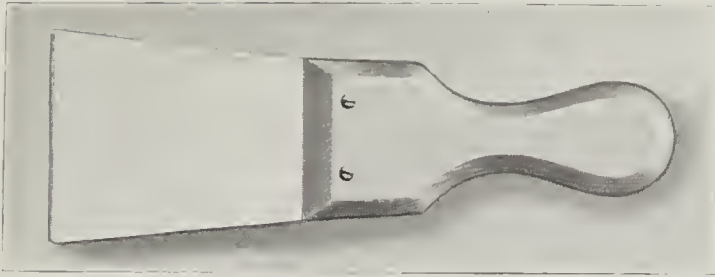


No. 111. Blade rolled, polished, and cross polished, 3 inches wide. Polished walnut handle with heavy metal bolster, brass rivets. Stiff or elastic, with clip point only.

No. 112. Same, with $3\frac{1}{2}$ -inch blade.

SUNDRIES

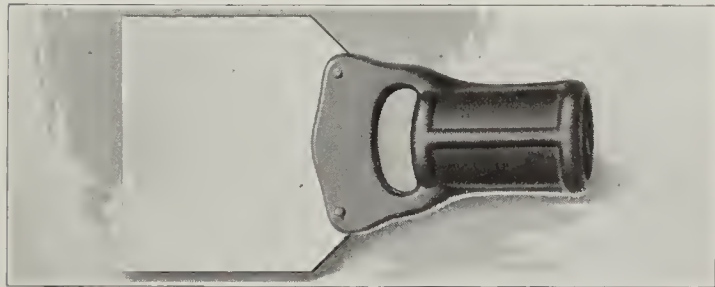
SCRAPERS, SEAM ROLLERS, KNIVES



WALL SCRAPERS

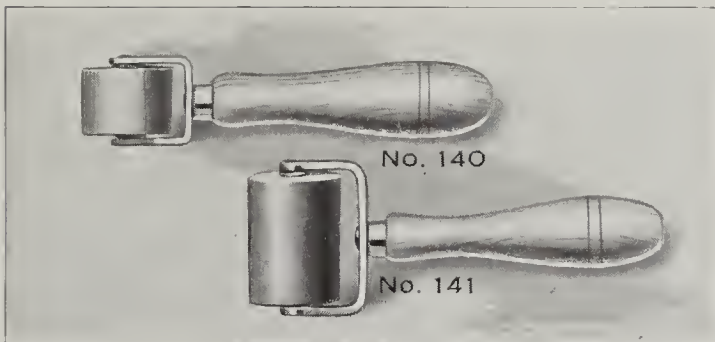
No. 120. Blade, $3\frac{1}{2}$ inches wide; beechwood handle.

No. 121. Blade, $3\frac{1}{2}$ inches wide; not beveled, beechwood handle.



SOCKET OR POLE SCRAPER

No. 122. This style of wall scraper is used on the end of a pole for scraping walls or removing wall paper. The blade is made of polished spring steel, $3\frac{1}{2}$ inches wide; malleable iron screw socket.



SEAM ROLLERS

No. 140. Genuine hard maple roller. 1-inch face; frame highly nickel-plated; polished handle.

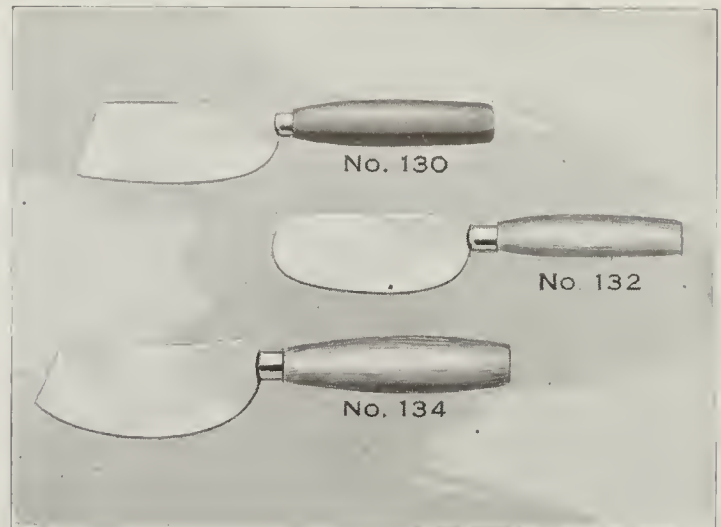
No. 141. Genuine rosewood roller, 2-inch face; nickel-plated frame; polished handle.



HACKING KNIVES

No. 143. Light blades, $4\frac{1}{2} \times 1\frac{1}{8} \times \frac{1}{8}$ inches; leather handles.

No. 144. Heavy blades, $4\frac{1}{2} \times 1\frac{1}{8} \times \frac{7}{32}$ inches; leather handles.



PAPERHANGERS' KNIVES

No. 130. Blade, $3\frac{3}{8} \times 1\frac{3}{8}$ inches, of highest grade steel, but not taper rolled; square point, stained maple handle.

No. 132. Blade, $3\frac{3}{8} \times 1\frac{3}{8}$ inches, high grade steel, taper rolled; round point, stained maple handle.

No. 134. Same, with square point.



CASING AND CORNER KNIVES

No. 150. Wheel, $1\frac{1}{2}$ inches in diameter; serrated edge; maple handle.

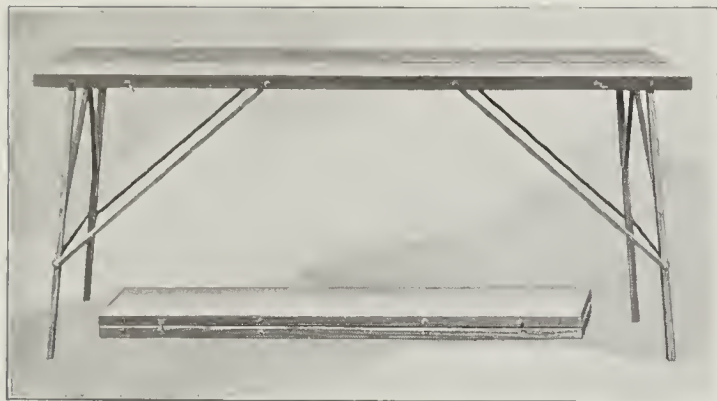
No. 151. Wheel, $1\frac{1}{2}$ inches in diameter; smooth edge; maple handle.

No. 152. Wheel, 2 inches in diameter; smooth edge, with thumb guard; maple handle.

No. 153. Milled Wheel and Knife Wheel, 1 inch in diameter. Knife $1\frac{1}{2}$ inches long. Serrated edge; maple handle.

PITTSBURGH PLATE GLASS COMPANY

PASTE TABLES, LADDERS, ROOF BRACKETS



FOLDING PASTE TABLES

Table top is made of clear, air-dried lumber (not kiln-dried), in two or three pieces, tongued and grooved, and glued to prevent warping. The table may be folded, as shown in the inset illustration, in ten seconds. Space inside for straight edge and tools. Height to top of table when open, 33 inches; width of top, 22 inches; folds to 11 inches. Average weight, 17 pounds. In lengths 6, 7, and 8 feet.



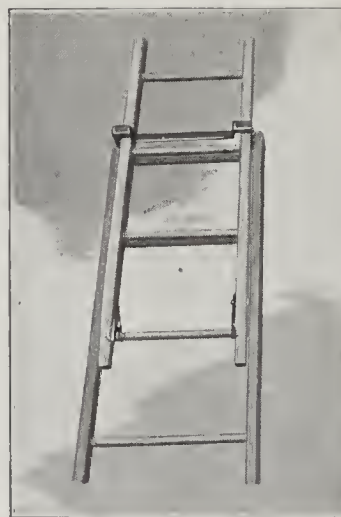
STEP LADDERS

This ladder is substantially built and is suitable for all-around work. It is made of selected, clear-seasoned Norway or Southern Pine. Steps are of a standard width. Stamped steel brackets are secured at top with steel rivets. Metal spreader. Iron brace rods under each step, with bucket shelf. In lengths 5, 6, 7, 8, 10, and 12 feet.



PAINTERS' LADDERS

The "Painter's Favorite." Made of selected stock, thoroughly braced, of great strength and durability. In lengths 5, 6, 7, 8, 10, and 12 feet.



EXTENSION LADDERS

Automatic extension ladders for operation with or without ropes. Best selected Norway or Southern pine, side rails, and hickory rungs. Gravity catch or rest, requiring no spring or extra rope. Furnished in two or three sections. Upper and lower sections from 10 to 24 feet long, for extension to 20 to 44-foot lengths.

Specify total length wanted and, for extreme lengths, whether two or three sections.

ROOF BRACKETS

Known also as safety stage supports. Placed in position by pushing the points under a shingle. So constructed that any increase in pressure increases the stability of the bracket. Made of heavy sheet steel. Sold singly or in sets of six.



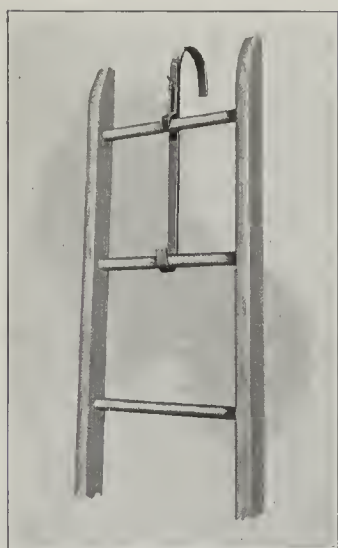
SUNDRIES

TRESTLES, JACKS, TORCHES, PLANKS, STAGES, TINWARE



PAINTERS' TRESTLES

These trestles are made of selected pine with hickory rungs. Hinged at top by heavy wrought eye bolts. In lengths 5, 6, 7, 8, 10, 12, 14, 16, 18, and 20 feet.



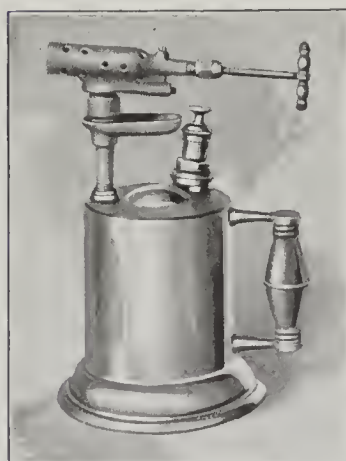
ADJUSTABLE SAFETY HOOK

Made of sheet iron, japanned. Spans two rungs of the ladder and is securely fastened by thumb set-screw. Will fit any ladder. The hook drops over ridge-board, insuring safety at roof work.

GASOLINE PAINT BURNERS

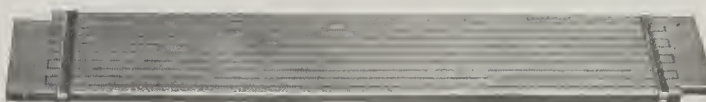
For burning off paint this Gasoline Torch is very efficient and economical, both for exterior and interior use. It generates a hot blue flame, and has adjustable heat pressure.

Made of polished brass. Pint and quart size.



LADDER JACKS

Made of heavy sheet iron, japanned, formed to fit securely over two rungs of a ladder. The slotted rack receives the free end of the upper hook in any one of the notches, which permits adjustment of the lower members to a perfect level. Furnished in pairs.



ADJUSTABLE EXTENSION PLANK

Made of ten pieces of clear Norway pine, each piece 1 inch thick by 1½ inches wide, total width 11½ inches. Much stronger and lighter than a solid board, more convenient to handle and safer to use.

Closed, 6 feet, extended 10½ feet

Closed, 8 feet, extended 13½ feet

Closed, 10 feet, extended 17½ feet

PAINTERS' STAGE OR SCAFFOLD

Made of best clear pine, very strong and heavy.

Regular stage, 20 inches wide, in 10, 12, 14, 16, 18, 20, 22, and 24-foot lengths.

Stage Hooks, 39 inches over all, clearance 21 inches.

Cross Bars with rollers.

Stirrups for cross bars.

PAINTERS' FALLS

Complete Manila rope and pulleys for Double Fall. Specify 5⁄8-inch or 3⁄4-inch rope. Lengths, 40, 50, 60, 70, 80, and 100 feet.

TINWARE

Paint and Calcimine Strainers, 11½-inch and 13½-inch diameter.

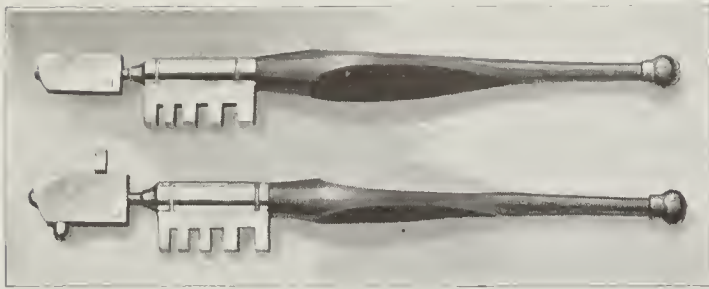
Paint and Calcimine Pails, 12 and 14-quart capacity.

Shellac and Varnish Pots, 1-pint, 1-quart, and 2-quart capacity.

PITTSBURGH PLATE GLASS COMPANY

GLAZIERS' DIAMONDS, STEEL WHEELS, CUTTERS

GLAZIERS' DIAMONDS



No. 200. Ebony handle, nickel-plated key; a good glaziers' diamond for general use.

No. 201. Rosewood handle, nickel-plated key; an excellent diamond for cutting single and double-thick glass.

No. 202. Cocobola handle, nickel-plated key; diamond of good quality and cutting spark. Recommended for heavy work and constant duty.



UNIVERSAL "SURE-CUT" GLAZIERS' DIAMONDS

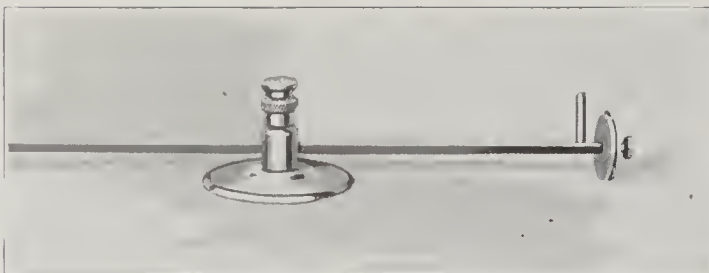
No. 204. Diamond is set in one end of the key and steel roller wheel in the other, by means of which correct angle for cutting is maintained. Key nickel-plated. For cutting single thick glass.

No. 205. Same as above with larger diamond for cutting glass of both single and double thicknesses.

GLAZIERS' DIAMOND RESET

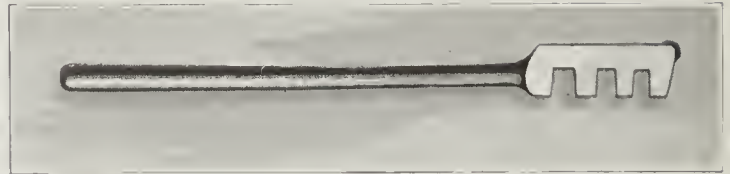
When the diamond no longer has a satisfactory cutting point, it may be sent to us for resetting.

TURRET HEAD GLASS CUTTER



No. 206. This cutter is provided with a turret head in which are fastened six hardened steel cutting discs. The plate holding the discs may be released and new discs inserted as required. Cuts circles $3\frac{1}{2}$ to 24 inches in diameter. Rod graduated to $\frac{1}{8}$ inch. Base is made of brass and is fitted with rubber cloth mat to prevent slipping.

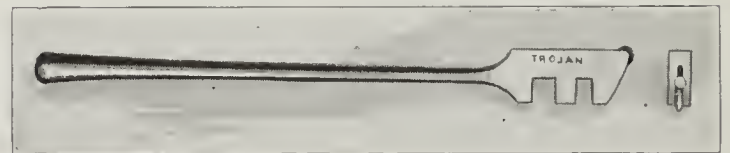
STEEL WHEELS



No. 208. Equipped with hand-honed, carbonized steel wheels or cutting discs. Correctly designed handle, finished in red.

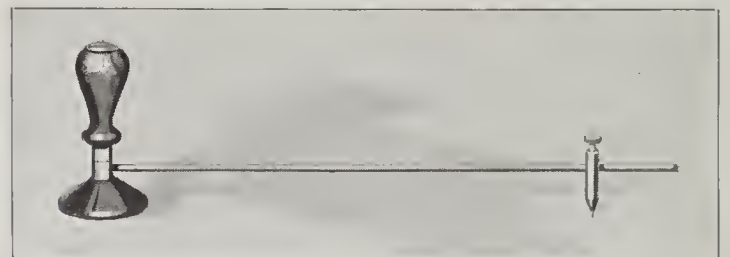
No. 209. Extra steel wheels for cutters.

"TROJAN" SELF-OILING CUTTER

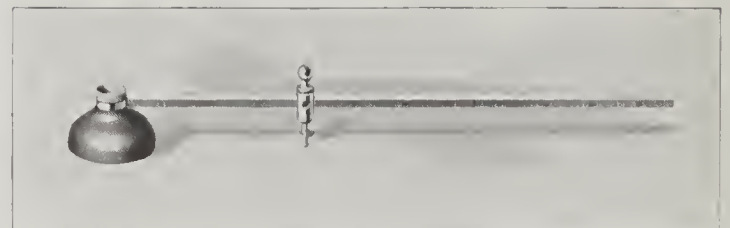


No. 210. Cutting discs or wheels are made of a specially selected grade of carbonized steel. The self-oiling feature is provided in the felt wick embedded in the head of the instrument, just below the cutting wheel. Dipped in Trojan cutting oil or kerosene, the disc is constantly lubricated, preventing chipping as well as dulling the edge of the cutter. Art glass workers find this tool especially adapted for their use.

CIRCULAR GLASS CUTTERS



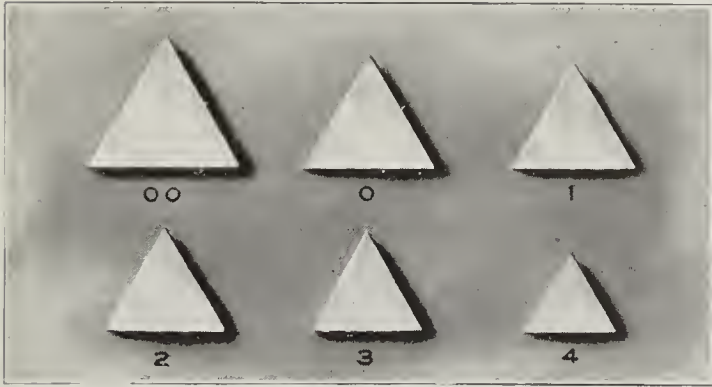
No. 211. Steel disc cutter. Cuts circles 2 to 40 inches in diameter. Round steel rod and adjustable steel head. Wooden base and handles, rubber cloth mat on face to prevent slipping.



No. 212. Steel disc cutter. Cuts circles 2 to 22 inches in diameter. Bar graduated to $\frac{1}{16}$ inch on one side. Heavy iron base fitted with rubber cloth mat to prevent slipping. Two extra cutting wheels supplied.

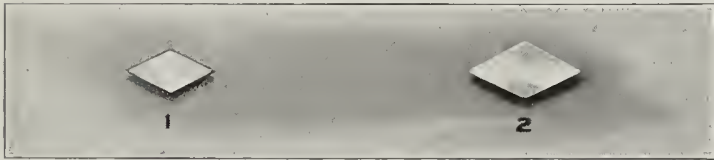
SUNDRIES

GLAZIERS' POINTS, DRIVERS, PLIERS, CUTTING BOARDS, RULES



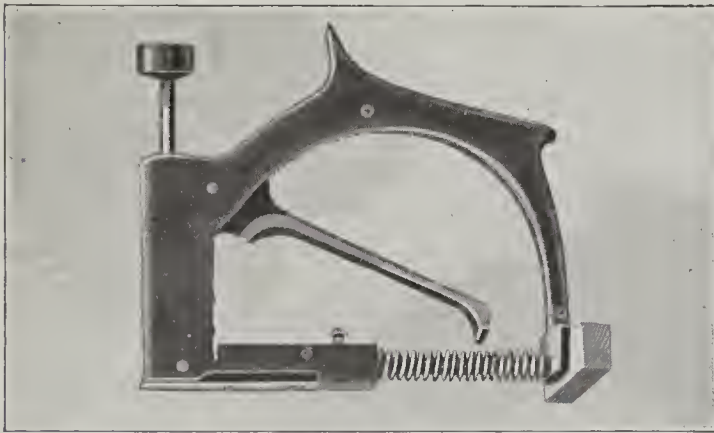
GLAZIERS' TRIANGLE POINTS

Made of pure zinc. Illustrations are exact size.



GLAZIERS' DIAMOND POINTS

May be set or driven only by using the diamond point driver shown in the accompanying illustration. Points are made of pure zinc. Illustrations actual size.



DIAMOND POINT DRIVERS

Frame is cast iron, finished in black japan, striped in bronze. Points are placed in the magazine and are fed to the barrel, one at a time. As the trigger is drawn toward the handle, the plunger is forced against the coil spring; after passing a certain point the trigger releases plunger which drives the point to its seat.

- No. 1. For No. 1 Points on small glass
- No. 2. For No. 2 Points on large glass

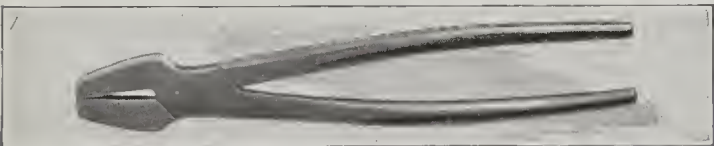
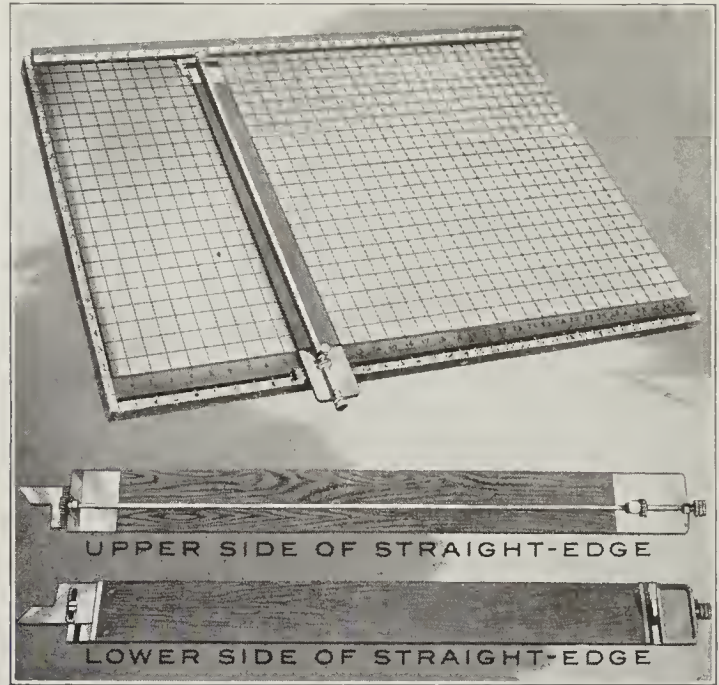


PLATE GLASS PLIERS

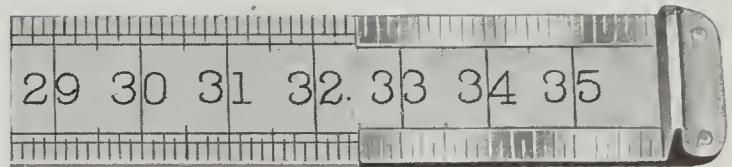
No. 3. Made of malleable iron, well finished. Tool steel inset jaws. Length over all, $8\frac{3}{4}$ inches; width of jaws, $\frac{11}{16}$ inch.



GLASS MEASURING AND CUTTING BOARD

Frame is made of seasoned lumber and is warranted to remain true. It is ruled both ways in inches, and the steel rule at the front is graduated in halves, fourths, and eighths of an inch. The straight-edge or rule is adjustable, being fitted at each end with adjustable gauges. The rule moves on metal guides and rollers, so that both ends travel the same distance. It is impossible to move one end of the straight-edge without the other. If several lights are to be cut to the same size, the straight-edge may be fastened by means of a set screw. These boards are indispensable to the dealer as they reduce breakage and make for accuracy and speed in handling.

- Size 24 x 36 inches
- Size 30 x 48 inches
- Size 36 x 54 inches
- Size 42 x 60 inches
- Size 48 x 72 inches

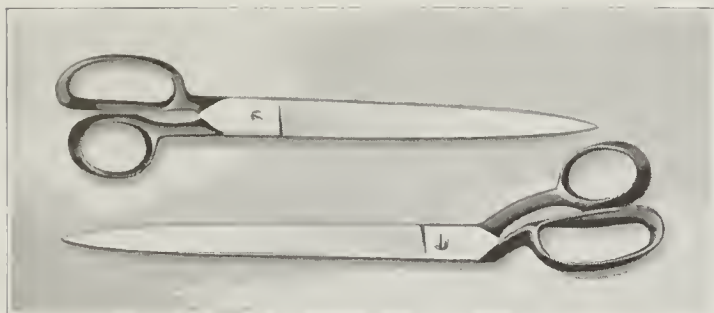


GLAZIERS' RULES

- Length 36 inches, width $1\frac{1}{2}$ inches, plain end
- Length 48 inches, width $1\frac{3}{4}$ inches, plain end
- Length 60 inches, width $1\frac{3}{4}$ inches, plain end
- Length 72 inches, width $1\frac{3}{4}$ inches, plain end
- Length 84 inches, width 2 inches, plain end
- Length 36 inches, width $1\frac{3}{4}$ inches, lip end
- Length 48 inches, width $1\frac{3}{4}$ inches, lip end
- Length 60 inches, width $2\frac{1}{2}$ inches, lip end
- Length 72 inches, width $2\frac{1}{2}$ inches, lip end
- Length 84 inches, width 3 inches, lip end

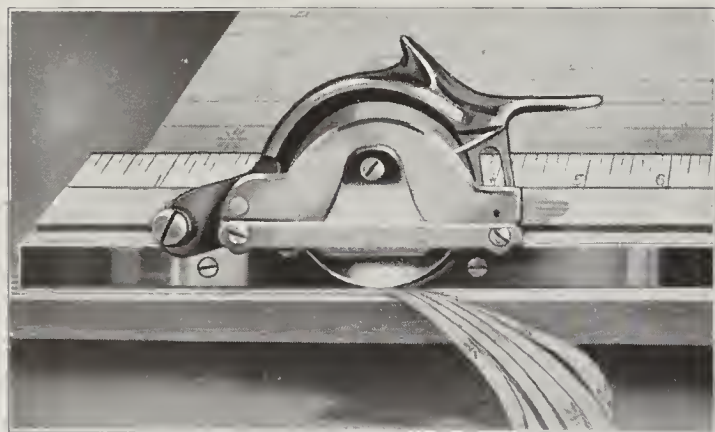
PITTSBURGH PLATE GLASS COMPANY

SHEARS, TRIMMERS, STRAIGHT-EDGES, PASTE BOARDS, DROP CLOTHS



PAPERHANGERS' SHEARS

- No. 162. 10-inch, Japanned straight handle, nickeled blade.
- No. 163. 12-inch, Japanned straight handle, nickeled blade.
- No. 164. 14-inch, Japanned straight handle, nickeled blade.
- No. 165. 16-inch, Japanned straight handle, nickeled blade.
- No. 166. 10-inch, Nickeled straight handle and blade.
- No. 167. 12-inch, Nickeled straight handle and blade.
- No. 168. 14-inch, Nickeled straight handle and blade.
- No. 169. 12-inch, Japanned bent handle, nickeled blade.
- No. 170. 14-inch, Japanned bent handle, nickeled blade.



WALL PAPER TRIMMER

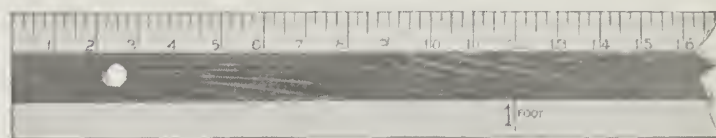
This trimmer trims lincrusta walton, burlap, and heavy pressed paper as easily as the ordinary kinds and cuts to a perfectly smooth edge. Several thicknesses of paper may be cut at one time, and each piece will be cut straight. Can be used only with a trimmer straight-edge. Straight-edge has a brass track running its full length, and the trimmer has a steel clip guide which runs on this track.

The cut is made on a strip of zinc 3 inches wide, which is laid on the cutting table or board. An outfit consists of trimmer, straight-edge, and zinc strip.

- No. 171. 6-foot outfit
- No. 172. 7-foot outfit
- No. 173. 8-foot outfit

ZINC STRIPS

- No. 175. Length 6 feet, width 3 inches
- No. 176. Length 7 feet, width 3 inches
- No. 177. Length 8 feet, width 3 inches

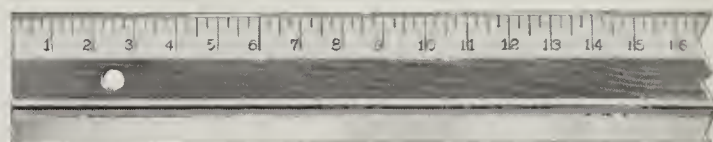


HARDWOOD STRAIGHT-EDGES

Without Brass Edge

Hard maple on outer edges, with redwood and white pine.

- No. 180. Length 6 feet
- No. 181. Length 7 feet
- No. 182. Length 8 feet



BRASS BOUND STRAIGHT-EDGES

Made of the very best white pine and California redwood, air dried. Built up in five sections, alternately, with grain reversed in each section. Width 3 inches, by 1/2-inch thick. Highly finished. All brass set with screws.

- No. 185. Length 6 feet
- No. 186. Length 7 feet
- No. 187. Length 8 feet



PASTE BOARDS

Paste board 1/2 inch thick, 23 inches when open, 11 1/2 inches closed. Batted ends. Three back-flap malleable hinges. Made of clear, air-dried basswood. Average weight, 11 pounds.

- No. 190. Length 6 feet
- No. 191. Length 7 feet

DROP CLOTHS

These cloths are used by painters, paperhangers, and decorators for covering merchandise while work is in progress. Supplied in three grades of fabric. Sheeting, Heavy-Drill and 8-ounce Duck, double-sewed on seams and hemmed all around. 9 x 12 feet, 12 x 15 feet, and 14 x 16 feet.

SUNDRIES

GRAINERS, CHAMOIS SKINS, SMALT, SAVOGRAN, ROOF PAINT, PACKAGES

EVERYBODY'S GRAINING SET

No. 5. The set consists of a rubber grainer and a steel comb. Sold separately or in connection with Pitcairn Waterspar Colored Varnishes for producing grain effects in refinishing old work.



STEEL GRAINING COMBS



No. 6. Set comprises eleven steel combs assorted, having six, nine, and twelve teeth per inch. The combined width of the comb in the set is 30 inches. Packed in partitioned tinned cases.

LEATHER GRAINING COMBS



No. 7. Made of oak-tanned, pliable leather, assorted for different graining; five in a set. Combined width, 20 inches.

CHAMOIS SKINS

Our Chamois Skins are oil-tanned, without the use of alum or acids. Skins of even thickness, soft and pliable. Packed in kips of 30 skins each, and in less quantities by the dozen in the following sizes:

8 x 10 inches	16 x 21 inches
10 x 13 inches	17 x 23 inches
12 x 14 inches	19 x 25 inches
13 x 16 inches	23 x 26 inches
14 x 18 inches	26 x 28 inches
15 x 20 inches	

SMALT

Smalt is a vitreous sand furnished in various screenings and colors for signwriters' and painters' use. Used for decorative effect by the signwriter to produce brilliancy and sparkle, as the facets of the glass particles reflect light; also used by painters for the protection of a painted surface subjected to wind and weather. Furnished in 25-pound sacks, two sacks to a carton, and in bulk. Colors: Black, blue, maroon, and green.

SAVOGRAN

Savogran is a dry powder used by painters and decorators to remove grease, smoke stains, dirt, loose flakes, and discolorations from painted and varnished surfaces before repainting or revarnishing. It does not remove filling, or discolor the wood. It is used also for removing paint from glass, marble, and metal work. Put up in bulk; may be had in any quantity.

ROOF LAST CARBON PAINT

Roof Last Carbon Paint is well known as a weather and waterproof paint of great durability. It is extensively used on shingle, metal, or felt roofs, also pumps, pipes, storage tanks, fences, iron and steel work, boilers, stacks, and farm implements. It is used also as a preservative and decay-resistant on fence posts, telegraph and telephone posts. Put up in 1 and 5-gallon cans, half-barrels of 25 gallons, and in full barrels of 50 gallons.

EMPTY PACKAGES

Empty varnish cans as follows:

- 1/16-gallon square varnish cans
- 1/8-gallon square varnish cans
- 1/4-gallon square varnish cans
- 1/2-gallon square varnish cans
- 1-gallon square varnish cans
- 5-gallon square cans, boxed
- 2-gallon jacket cans
- 3-gallon jacket cans
- 5-gallon jacket cans
- 10-gallon jacket cans

PITTSBURGH PLATE GLASS COMPANY

GOLD AND ALUMINUM ENAMELS, BRONZE POWDERS AND LIQUIDS, LEAF

PITCAIRN GOLD ENAMEL

In special cans, Gold and Liquid in special compartments ready for mixing; also bottles, ready-mixed. For picture frames, radiators, and general household decoration, or for any article of iron, leather, wood, or glass.



- No. 1 Size contains 1 oz. (Ready-mixed in bottles)
- No. 2 Size contains 2 oz. (Compartment cans)
- No. 3 Size contains 4 oz. (Compartment cans)
- No. 4 Size contains 8 oz. (Compartment cans)

PITCAIRN ALUMINUM ENAMEL

In special cans, Aluminum Powder and Liquid in separate compartments ready for mixing; also bottles, ready-mixed. For bedsteads, gas fixtures, radiators, bric-a-brac, and general household decoration.



- No. 1 Size contains 1 oz. (Ready-mixed in bottles)
- No. 2 Size contains 2 oz. (Ready-mixed in bottles)



- No. 3 Size contains 4 oz. (Compartment cans)
- No. 4 Size contains 8 oz. (Compartment cans)

BRONZE POWDERS

Pale Gold is color of Gold Leaf, Rich Gold is Brass Color. Five grades, according to quality—No. 500, No. 1000, No. 2000, No. 4000, No. 8000.

Each grade furnished in Pale Gold or Rich Gold, 1-ounce papers, 1-pound cans, 50-pound drums.

Decorators' and Fresco Bronzes

Pale Gold Fresco, Extra Superior Fresco, Pale Gold, French Pale Gold Leaf Bronze. 1-ounce papers, 1-pound cans, 50-pound drums.

Aluminum Bronze Powders

C. P. Aluminum, Extra Superior Fresco Aluminum, Commercial Aluminum. 1/2-pound cans, 1-pound cans, 50-pound drums.

Radiator Bronzes

Pale Gold Radiator, Extra Fine Pale Gold Radiator, Copper, C. P. Aluminum Radiator. 1-pound cans, 50-pound drums.

Colored and Special Bronzes

For the manufacturing trade, decorators; metallic fixtures, statuary, moulding and frame makers.

The many shades of Colored Copper Bronzes, Patented Bronzes, Aniline Dyed Shades, Fire Bronzes, Antique Bronze Statuary, Vernis Martin and Roman Gold, Brass Fixture Bronzes. In 1/2-ounce and 1-ounce papers, 1-pound cans, 50-pound drums.

BRONZING LIQUIDS

1. Manhattan—Commercial Grade. 2. Empire—Medium. 3. Pitcairn—Highest Grade Liquid. In cans: 1/2-pint, pint, quart, 1/2-gallon, 1-gallon; and in half-barrels and barrels for the manufacturing trade.

The Bronze Powders are ready for use when mixed with the Bronzing Liquid to proper consistency for application. For average surfaces 1 pound Gold Bronze Powder to 1/4 gallon Liquid; 1 pound Aluminum to 1 gallon Liquid.

With the proper liquid, the bronzes listed dry out quickly to a smooth flat finish, and when dry are free from odor. Best results are obtained by applying bronzes with soft hair brushes; camel or goat hair.

GOLD, SILVER, AND ALUMINUM LEAF

For decorators' and signpainters' use.

Gold Leaf XX Deep (for interior use)

Gold Leaf Patent (for exterior use)

All Gold Leaf is 3 3/8 x 3 3/8 inches. 25 leaves to the book and 20 books to the pack.

Silver Leaf, 3 3/4 x 3 3/4 inches. 25 leaves to the book; 20 books to the pack.

Aluminum Leaf, 5 1/2 x 5 1/2 inches. 50 leaves to the book; 10 books to the pack.

ALUMINUM PAINT, READY-MIXED

For use on iron, stoves, ranges, boilers, engines, smoke stacks, furnace fronts, oven interiors. One gallon will cover about 300 square feet, one coat, on metal surface. 1-gallon cans, ready-mixed.

SUNDRIES

LEADS, LINSEED OIL, PUTTY

WHITE LEAD

Strictly pure White Lead, dry, and in oil. Popular brands supplied in original packages; 1 and 5-pound cans, 12½, 25, 50, and 100-pound kegs, and barrels.

LEAD OXIDES

Red Lead, dry, and in oil, 12½, 25, 50, and 100-pound kegs. Litharge and Orange Mineral dry only; in kegs or in quantities as required.

AMERICAN WHITE

A combination paste, white, ground in oil, for plumbers' use and general utility purposes. 1 and 5-pound cans.

WHITE COTTON WASTE

For painters, mechanics, garages, and general use. In bales 100-pound, 50-pound, and in bulk as desired.

STRICTLY PURE PUTTY

Made from pure whiting and linseed oil. A reliable putty recommended to those desiring the best grade.

Put up in 900-pound barrels; 500-pound half-barrels; also 100, 50, and 25-pound packages.

STANDARD PUTTY

This is an intermediate grade of putty for general glazing purposes.

Put up in 900-pound barrels; 500-pound half-barrels; also 100, 50, and 25-pound packages.

COMMERCIAL PUTTY

This grade of putty is made for ordinary use.

Put up in 900-pound barrels; 500-pound half-barrels; also 100, 50, and 25-pound packages.

STEEL SASH PUTTY

For glazing metal sash. Specially prepared for adhering to glass and metal. Dries hard but not brittle. Does not shrink or crumble.

Put up in 900-pound barrels; 500-pound half-barrels; also 100, 50, and 25-pound packages.

LIQUID GREENHOUSE PUTTY

For application with glazing gun, putty bulb, or with putty knife.

Put up in barrels, 100-pound and 25-pound kegs.

LINSEED OIL

Strictly pure, raw and boiled, sold by weight, seven and one-half pounds constituting a gallon; in drums, barrels, and in smaller containers as required.

TURPENTINE

Pure gum spirits of Turpentine, sold by weight, seven pounds constituting a gallon; in drums, barrels, and in smaller quantities as required. (See also Lep-tyne, the superior Paint Thinner.)

DENATURED ALCOHOL

For cutting shellac gums, thinning shellac varnishes, spirit stains, varnishes, and for use as an anti-freeze solution in water-cooled motors. Denatured in accordance with U. S. Government formulas, 130° and 138° proof; in drums, and in smaller containers as required.



Dry Color on Racks in Drying Room, Milwaukee Factory



RED WING QUALITY LINSEED OIL

RED WING LINSEED OIL has been manufactured and marketed for more than twenty years by our mill at Red Wing, Minnesota. It is produced from the very choicest flaxseed obtainable. Every care is exercised, from the cleaning of the seed to the filling of the container in which the oil leaves the mill, to produce the very highest grade of Oil that can be made. Every mill operation is under the actual control and thorough supervision of the experienced chemists and associates in charge of our laboratory.

The Linseed Oil Mill at Newark, New Jersey, is advantageously located, not only for convenience to the imported raw material and the distribution of the finished product in the eastern territory, but also for the export of the oilcake, an important by-product of Linseed Oil manufacture, most of which finds its market in Europe. The ultimate capacity of this plant will be 1,500,000 bushels of flaxseed.

Linseed Oil is marketed for the most part in two forms, "Raw" and "Boiled," except when special oils

are required for special purposes. Raw Linseed Oil is the oil in its natural state. Every gallon of Red Wing Quality Raw Linseed Oil is filtered several times and properly aged, the result being a perfectly clear product.

Boiled Linseed Oil is made from Red Wing Quality Raw Linseed Oil and pure Linoleate Drier, which we make according to our own formula. The boiling process consists of two distinct operations: one, the manufacture of the pure lead-manganese Linoleate Drier, and the other, the preparation of the Raw Oil for the incorporation of the Drier. After these two are thoroughly blended, the Oil is allowed to cool for days. It then goes through our special process of clarification, which results in a clear, brilliant Oil, possessing the same perfect brushing qualities as our Raw Linseed Oil, and drying to a smooth, elastic film in from twelve to sixteen hours.

Red Wing Quality Boiled Linseed Oil contains no resin or resins of any kind.

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